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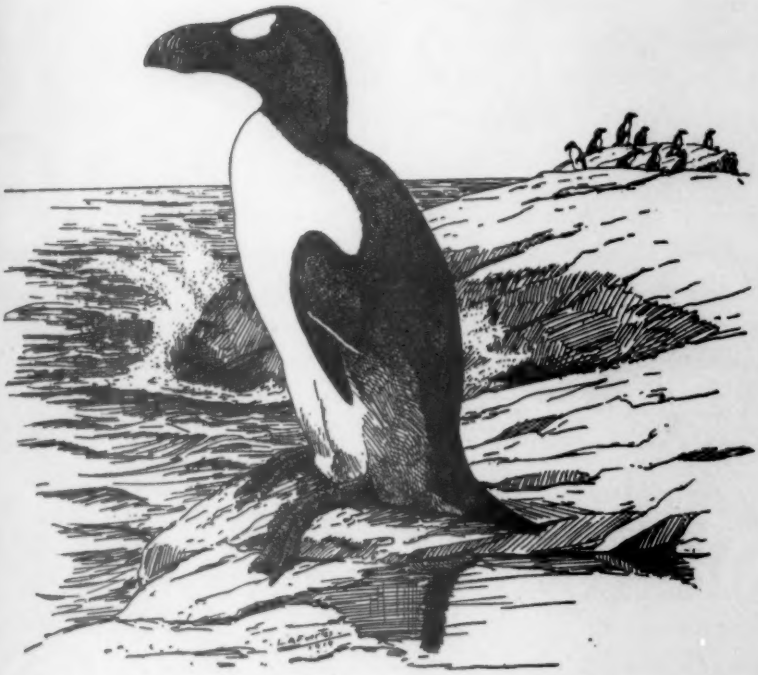

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THE PRESENT STATUS OF THE DOUBLE-CRESTED CORMORANT ON THE COAST OF MAINE[1]

BY ALFRED O. GROSS

Plates 19–22

GREAT changes in the distribution and abundance of certain sea birds of the islands on the coast of Maine have taken place in recent years. For example, the first records of the nesting of the Great Black-backed Gull, *Larus marinus,* were made on some of the more eastern islands as recently as 1931. Today this gull is abundant and nests on many islands along the entire coast line from the Bay of Fundy to the Isles of Shoals and beyond. The Herring Gull, *Larus argentatus smithsonianus,* likewise has so greatly increased in numbers that the U. S. Fish and Wildlife Service has been forced to take definite steps in controlling this bird which at the turn of the century was threatened with extermination. Other species have experienced similar changes but none have been more spectacular than the extraordinary comeback of the Double-crested Cormorant, *Phalacrocorax auritus auritus,* commonly known on our coast as the "Shag."

The first accounts of the cormorants on the New England coast are to be found in the writings of Captain John Smith (1616) who visited this region in 1614. Later, others, including William Wood (1634), Thomas Morton (1637), and John Josselyn (1674), indicated that the cormorants were breeding here in large numbers 300 years ago. For reasons that are not clear, the cormorant was completely exterminated as a breeding bird on the Maine coast by the nineteenth century. Everett Smith (1883) wrote of the Double-crested Cormorant as follows: "None breed on the coast of Maine, although some are here all summer. These are chiefly immature birds which keep together in flocks and habitually resort to the same ledges each night to roost."

[1] Contribution Number 12, Bowdoin-Kent Island Scientific Station, Kent Island, Bay of Fundy, New Brunswick, Canada.

Records of an attempt of this bird to reëstablish itself as a nesting bird on the Maine coast are contained in an article written by Ora W. Knight (1896). On July 2, 1895, he visited Black Horse Ledge, off Isle Au Haut, where he found two nests with three eggs, one nest with a single egg, and other nests in process of construction. He writes further: "Mr. Charles K. Reed informs me that in June 1892 and 1893 he took sets of the Double-crested Cormorant eggs near Isle Au Haut, and beyond doubt he visited the same colony of birds." In another paper, Knight (1900) mentions visiting Black Horse Ledge on June 23, 1896, as follows: "We found a number of Shags on the ledge, but only two nests were to be found. One of these was incomplete and the other showed the imprint of three eggs, and as we afterwards learned that other collectors had been there, the eggs undoubtedly taken by them. . . . Owing to the attentions of collectors it is somewhat doubtful if this species continues to breed many more years along the Maine coast, as the only breeding colony I have any knowledge of is on the point of extermination." That this attempt of the cormorants was quickly extinguished is borne out by visits of other naturalists to the ledge in subsequent years. Black Horse Ledge was even deserted as a roosting place of the cormorants before 1907.

Mr. A. H. Norton made annual visits all along the coast during the years from 1902 to 1923 and, although many cormorants were found roosting on various ledges and islands, not one was found to be nesting. About 1925 the Cormorants started nesting again and in a surprisingly short time firmly established themselves as breeding birds on the coast. In 1931, Mr. A. H. Norton and Robert P. Allen (1931) found the following breeding colonies: Old Man Island, 1,000 adults; Pulpit Rock, 100 adults; Spoon Ledge, 40 adults; Marblehead Rock, 600 adults; and Old Hump Ledge, 8 adults.

In 1935, Howard L. Mendall published his comprehensive paper on the Homelife and Economic Status of the Double-crested Cormorant. In this report he includes the colonies listed by Norton and Allen and states that in 1935 the Marblehead colony had increased to 700 birds and the Old Hump Ledge colony to 400 birds. He also reported 78 nesting birds on Crescent Ledge in 1934, but this colony was abandoned in 1935.

During the past three years it has been my good fortune to serve as a Collaborator with the U. S. Fish and Wildlife Service in connection with the Herring Gull Control Project. I wish to express my gratitude to Mr. S. B. Locke, Regional Director, who made it possible for me to have this exceptionally fine opportunity to study the sea-bird

colonies of the entire Maine coast and to record the changes that are taking place. This paper is concerned primarily with an account of the recent increase and present status of the Double-crested Cormorant but other species will be considered in subsequent reports.

In 1935, there were but six known Cormorant colonies and only one of these, Old Hump Ledge in Muscongus Bay, was west of Penobscot Bay. In 1943, we found prosperous colonies along the entire coast from Old Man Island, our most eastern sea bird colony, near Grand Manan Channel, New Brunswick, Canada, to Duck Island, Isles of Shoals just inside the New Hampshire State boundary off Portsmouth.

The chief objective of the U. S. Fish and Wildlife trips was to visit gull-inhabited islands; the cormorant colonies were incidental—hence some of the latter probably were missed, but even so, 27 colonies were visited which contained a total of 9,118 nests representing that many pairs of birds. Furthermore, since each year the time of visiting the islands on which the cormorants were nesting was comparatively early in the season, the last ten days of May and the first three weeks of June, the numbers of nests were probably smaller than they would be at the height of the nesting season. A very conservative estimate of the number of adult Double-crested Cormorants nesting along the Maine coast in 1943 is 10,000 pairs or 20,000 individuals. There are at least 5,000 non-breeding birds which roosted on the numerous ledges and islands all along the coast, making a total population of 25,000 cormorants. The numbers have now increased to the point where many complaints are being made against this bird by the fishing industry for its alleged depredations on fish. A movement is on foot in this state to pass legislation taking the cormorant off the protected list. If an unbiased investigation does prove the birds are doing a real damage, it would seem advisable to have the matter of control placed under the direct supervision of the state or federal departments rather than to allow the indiscriminate shooting of the birds by irresponsible persons. The latter course would tend to undo much of our work of conservation and it would prove to be disastrous to other sea birds such as the Eider Duck which nests on many of the same islands inhabited by the cormorants.

The fishermen probably have sound grounds for their complaints although their statements are sometimes exaggerated. There seems to be some question as to the reported damage by the cormorant. H. L. Mendall (1935), who conducted studies on the economic status of the cormorant in Maine, states: "The charge that the Cormorants

are detrimental to the fishing industry are shown to be largely unfounded, the greater part of the bird's food being made up of forms which are of little or no use to the fishing industry. In some cases, the birds are a benefit through their fondness for undesirable fish."

The cormorant, unfortunately, was not included in the list of migratory non-game birds protected by the Migratory-bird Treaty Act and Regulations ratified in 1916. The protection of this bird in Maine comes under the jurisdiction of the State Department of Inland Fisheries and Game.

To present the status of the Double-crested Cormorant on the Maine coast, all of the present existing colonies known to me are listed in order beginning with the most eastern one situated on Old Man Island and proceeding from east to west and south to the Maine-New Hampshire state boundary line. To assist the reader in finding the islands on maps, the approximate latitude and longitude are given. A brief description of the islands and a historical account of the cormorants, especially during the past three years, are also included.

It will be seen that not only have the number of colonies increased, but the populations in 1943 were often doubled or tripled and in a few cases were more than four times the numbers present in 1941. This increase in the numbers of cormorants and the extension of their breeding range are not peculiar to the coast of Maine. Dr. Harrison Lewis (1942) reports that the Double-crested Cormorants are on the increase along the north shore of the Gulf of St. Lawrence. On June 11, 1942, Harold S. Peters (1942) found a colony of 100 nests at Cape Tryon, Prince Edward Island, Canada, which constitutes the first record of these birds nesting on that island.

In Massachusetts, Baird, Brewer and Ridgway (1884) stated: "It is believed once to have been resident on the northern shores of Massachusetts, but long since to have been driven away." Today this bird has again established itself as a nesting species on that part of the New England coast. Joseph A. Hagar (1941) discovered a colony of 53 pairs of Double-crested Cormorants breeding at Shag Rocks near Boston Light at the entrance of Boston Harbor, on August 5, 1940. According to Mr. Hagar, the birds were nesting there as early as 1937. This is the first recent nesting record for Massachusetts. On June 28, 1942, Frances L. Burnett (1942) found two nests, one empty and the other with four eggs, at Egg Rock, off Manchester, Massachusetts. The following year on June 19, Burnett (1943) reported finding four nests with eggs and young at the same place.

The Double-crested Cormorant has been reported in increasing numbers, during the summer, along the Rhode Island and Connecticut shores. If the present tendency of the extension of the nesting range prevails, it may be reasonably expected that the birds will be found nesting in that region before many years elapse.

The European or Common Cormorant, *Phalacrocorax carbo,* is the species found on our coast during the winter. I have seen a few of them during the nesting season in eastern Maine, and A. D. Cruickshank (1938) has found them as far west as Muscongus Bay during the summer months. On May 30, 1939, Harold S. Peters (1940) found one-fourth of the adult birds of a colony of 212 occupied nests, situated ten miles north of Antigonish, Nova Scotia, to be *Phalacrocorax carbo.* According to Peters, the European Cormorants probably invaded the Antigonish colony in 1938. As yet I have no evidence of their nesting in New England, but since there is a possibility that *P. carbo* will continue to extend its breeding range, it is important that we be on the watch for its nesting on the islands of the Maine coast.

Old Man Island; 44° 37.1′ N., 67° 14.2′ W.

Old Man Island, which lies southeast of the entrance to Little Machias Bay, supports the most eastern of the important Maine seabird colonies. It is a high, rugged island with precipitous rocky shores making a landing difficult when a rough sea prevails. The top surface is covered with a reddish-brown peaty soil which supports a considerable number of spruce trees. Most of the trees are now dead, some are still standing but the majority have been blown down by the storms of recent years, making a tangled network of jagged stumps, trunks, and broken limbs. In the few open spaces there is a luxuriant growth of grass, weeds, vines, wild parsnips, and many smaller plants.

On April 19, 1923, A. H. Norton reported ten Double-crested Cormorants roosting on the island, but at that time none of them were nesting. Just when the birds started nesting on Old Man Island is not known but they had probably established themselves as a nesting colony about 1925 or soon thereafter. R. P. Allen and A. H. Norton estimated 1,000 Cormorants, 4,000 Herring Gulls, and a few Eider Ducks as nesting there on June 24–26, 1931. The cormorants had built one to seven nests to a tree, all over the island, but none of the nests were on the ground. Many of the nests contained eggs but others had freshly hatched young and a few contained nestlings in advanced stages of development.

When I visited the island on June 6, 1943, there were 333 occupied

nests, but the greater number of them (218) were built on the barren rocks or on the ground of the cleared places and others upon or among the fallen tree trunks. Only 115 nests were placed in the dead trees that were still standing. The nests contained one or two eggs, some had three, and only five contained sets of four; and none had five. There were no young and all of the eggs examined were fresh or else incubation had advanced but a few days. The state of the eggs and the large number of nests in early stages of construction clearly indicated that the colony had not reached the height of its nesting activity. Since most of the colonies along the western part of the Maine coast had young, some in advanced stages at this date, it is probable that this colony had been molested by human visitors. Counts and estimates of the numbers of adult birds indicated that there were more than 1,000 cormorants in the Old Man Island colony in 1943. In addition to the cormorants, there were about 4,000 Herring Gulls, eight pairs of Black-backed Gulls, and 25 pairs of Eider Ducks nesting on the island.

The Brothers Island; 44° 33.4′ N., 67° 26.5′ W.

These two high, picturesque islands, connected by a low, rocky isthmus, stand out boldly overlooking the Atlantic. The tops of the 100-foot knolls command an excellent view of the numerous islands guarding the entrances of Machias and Englishman's bays. The islands are well turfed, providing grazing for a number of sheep. These islands were once heavily wooded with coniferous trees, but today there are only a few small spruces struggling for existence at the northern edge of the larger island. There are nearly perpendicular rocky precipices along the sea at the eastern end of the island which provide nesting sites for Ravens and on the talus slopes below there are many Black Guillemots.

On June 13, 1941, the cormorants were found nesting for the first time. There were three nests with one egg each, two nests with two eggs, and one nest containing four eggs. On June 19, 1943, many cormorants were seen on the higher outcroppings of rock but no nests had been built by that time. There are 3,000 Herring Gulls and 50 pairs of Black-backed Gulls nesting on the island.

Pulpit Rock; 44° 33.2′ N., 67° 28′ W.

About a mile west of the Brothers stands barren Pulpit Rock with jagged pinnacles separated by deep, abrupt clefts. In 1903, Mr. A. H. Norton found cormorants roosting in considerable numbers, but none were nesting. None nested on these rocks from 1903 to 1923 although

the place was used by a large number of the birds as a roosting place each summer. The birds started nesting there some time between 1924 and 1931. In 1931, Norton and Allen reported finding 50 occupied nests and a total of about 500 birds. When I visited this rocky islet on June 19, 1943, there were approximately 100 nests and many non-breeding cormorants.

The Ladle; 44° 29′ N., 67° 44.3′ W.

South of Cape Split is a curiously shaped island which resembles an inverted ladle; hence the name. On the high dome the cormorants have roosted during the past three years. On June 8, 1943, they were nesting for the first time. On the exposed rocks of the northeast side there were three nests, one with one egg and two nests with three eggs each. There were also one empty nest and several nests in various stages of construction. On the opposite side of the dome there was another group of partially constructed nests. The Ladle offers an ideal nesting site for the cormorants; hence the year 1943 may mark the beginning of a large prosperous colony of the future.

Black Horse Island; 44° 1.7′ N., 68° 34.6′ W.

This dark colored, steep, rocky ledge is situated about one and one-half miles east of the large island of Isle Au Haut. The first record of the presence of nesting cormorants on this ledge is a statement by Chas. K. Reed that he took sets of Double-crested Cormorants' eggs near Isle Au Haut in June, 1892, and 1893. As this was the only known colony in that region, there is no doubt that the eggs were taken on Black Horse Island. Ora W. Knight (1900) found seven nests on narrow shelves near the top of the ledge on July 3, 1893. Three of the nests contained three eggs each, one nest contained a single egg, and the other three nests were empty. On July 2, 1895, he found two nests with three eggs each and one nest with one egg. When he visited the island on July 23, 1896, there were a considerable number of cormorants but only two nests; one was incomplete and the other showed the imprint of three eggs which he states had been taken previously, presumably by some collector. In June, 1899, a few birds were observed but there were no nests. William Dutcher (1901) visited Black Horse Island in 1900 and he likewise saw a few cormorants but no nests. According to A. H. Norton, Black Horse Island was abandoned by the roosting cormorants in 1907. Just when the birds returned is not known, but there were no cormorants there up to 1931 as Mr. Norton made frequent visits up to that year. When I visited the island on June 12, 1942, there were several hun-

dred cormorants on the island and approximately 50 nests. On June 10, 1943, there were 75 nests and probably more were added after my visit. At the times of the above visits there were large numbers of cormorants roosting on White Horse Ledge which lies about a half mile northeast of Black Horse Ledge, but we could see no nests as we circled the ledge in our boat. According to H. L. Mendall (1936) there was a population of twenty-four breeding birds on White Horse Ledge in 1933.

Colt Head Island; 44° 15.6′ N., 68° 50.5′ W.

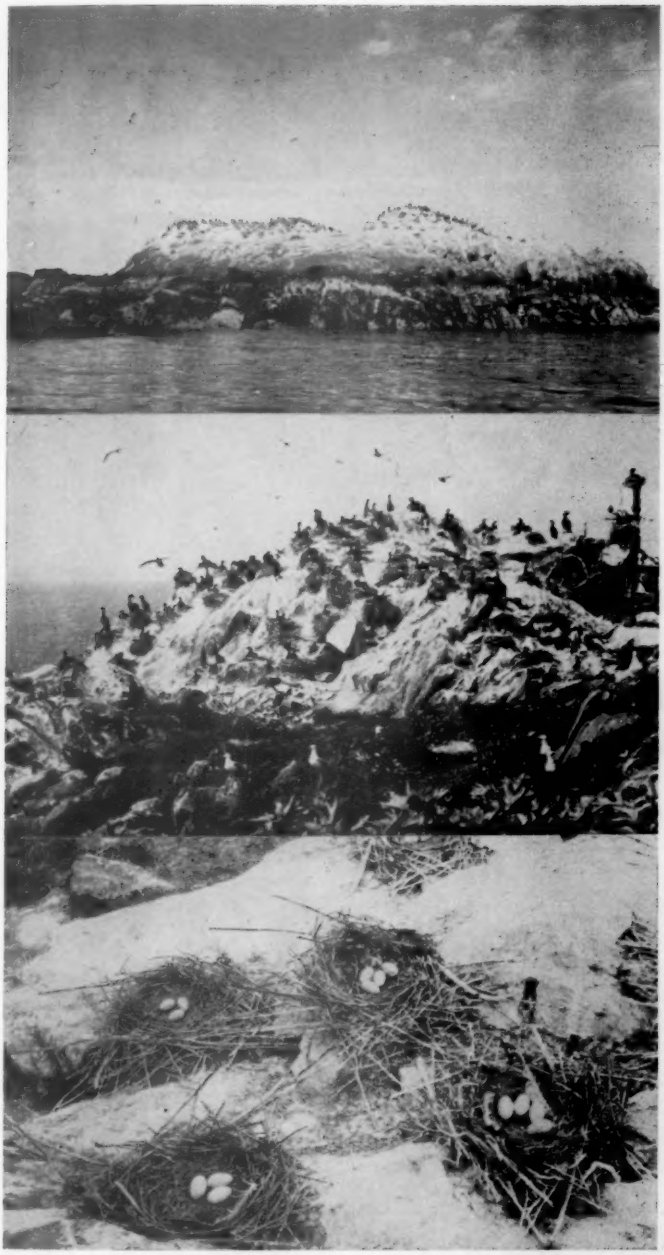
Colt Head Island, situated in East Penobscot Bay, is the site of one of the largest cormorant colonies on the Maine coast. On June 8, 1941, there were 680 nests of the cormorants, 265 of which were placed in dead spruce trees and 415 on the rocks or barren soil. There were also a considerable number of nests in various stages of construction. All of the occupied nests contained eggs and no young were seen at the time of this visit. From one vantage point I counted 950 adults swimming on the water where they had collected after leaving their nests.

On June 9, 1942, the progress of nesting had advanced over that prevailing on June 8 of the preceding year. At this time there were 1,253 nests of which 727 were placed in the dead trees and 526 were on the rocks or ground. The contents of 82 nests of a typical ground-nesting area were as follows: four nests with one, six nests with two, twenty-eight nests with three, thirty-six nests with four, and two nests with five eggs or young. There were also six nests under construction. In the sample of 82 nests, 20 contained pipped eggs, freshly hatched young, or young two or three days old. Some of the nests in the trees contained older young.

On June 3, 1943, the colony contained only 870 nests, of which 406 were in trees and 464 were on the rocks or ground. Many of the dead trees had fallen, and this accounts for the smaller proportion of nests in trees. There were no young at this time and the large number of broken eggs about the nests and dead adults that had been shot clearly indicated that the colony had been seriously disturbed. We learned later that several men had visited the island for the purpose of destroying this populous colony because of alleged damage to the fishing industry by the birds.

Spoon Ledge; 44° 12′ N., 68° 49.8′ W.

Spoon Ledge is situated in upper Penobscot Bay north of North Haven. It is a small, high, irregular rocky ledge. There are no trees or shrubs and only a very limited growth of grass and weeds



DOUBLE-CRESTED CORMORANT.—(*Top*) SPOON LEDGE, REPRESENTING A TYPICAL NESTING COLONY—JUNE 3, 1943. (*Middle*) A SECTION OF THE COLT HEAD ISLAND COLONY WHICH COMPRISED 1253 NESTS ON JUNE 9, 1942. HERRING GULLS AND EIDER DUCKS WERE NESTING IN THE FOREGROUND. (*Bottom*) NEST AND FOUR EGGS; WESTERN BROWN COW ISLAND, MAY 20, 1943.

DOUBLE-CRESTED CORMORANT.—(*Top*) WESTERN EGG ROCK COLONY, MAY 31, 1944. (*Middle*) NESTING CORMORANTS WITH EGGS ON PICTURESQUE OLD HUMP LEDGE, JUNE 1, 1944. (*Bottom*) A GROUP OF CORMORANT NESTS OF THE PUMPKIN ISLAND COLONY, MAY 29, 1943.

in a few isolated spots. The higher portions of the rock are white from the excrement of the birds, making it a conspicuous landmark among the many islands of that part of the bay.

The first report of the cormorants breeding on this ledge was in 1931 when Norton and Allen reported a population of 40 nesting cormorants, and D. Berolzheimer (1932) found 34 in the same year.

On June 7, 1933, I visited the island with Mr. Joseph Stickney, Supervisor of Wardens, State of Maine, and Mr. A. C. Shelton of Boston. At that time we found 75 nests with eggs or young. In one nest the young were about a week old. There were also a number of nests in various stages of construction. I visited the island again the following year with T. Gilbert Pearson and others, on May 26 and 27, and made a complete census of the nests and their contents as follows:

	Nests	*Eggs*
Nests under construction	12	—
Nests with eggs: One	4	4
Two	11	22
Three	37	111
Four	73	292
Five	5	25
Total	142	454

On June 8, 1941, a census revealed that the population of the colony was practically the same as it was in 1934. At that time there were 145 nests containing about the same relative number of eggs. A census made on June 10, 1942, revealed that the colony had increased to 225 nests with the following contents:

	Nests	*Eggs and young*
Nests under construction	8	—
Nests with eggs: One	14	14
Two	16	32
Three	66	198
Four	38	152
Five	3	15
Nests with young: One	15	15
Two	37	74
Three	24	72
Four	4	16
Total	225	588

On June 3, 1943, Spoon Ledge, which started with a population of 40 cormorants in 1931, now contained 728 nests representing a

population of 1,456 nesting birds. Including the non-breeding individuals and those not yet represented by nests, the total number of birds for this one colony approaches near the 2,000 mark.

Fisherman's Island; 44° 2.5′ N., 69° 2.4′ W.

Fisherman's Island is situated about two miles off Ash Point, southeast of Rockland. It is a large, high island, well turfed with a rank growth of grass and small herbaceous plants. There are no trees or shrubs but there are several dense patches of red raspberry vines. This island is primarily a Herring Gull colony. There are also 25 pairs of Black-backed Gulls, 12 pairs of Eider Ducks, and several pairs of Black Guillemots nesting there.

On my first visit to the island, June 7, 1935, there were no cormorants nesting but numbers were seen flying by on their way to Marblehead Island to the southward. During the following four years the high, rocky point at the northern end of the island was used as a roosting place. The birds nested for the first time in 1940 when there were about a dozen nests. On June 8, 1941, there were 45 nests as follows: seven nests in stages of construction, six with one, ten with two, 19 with three, and three with four eggs. In 1942 there were 100 nests and on June 1, 1943, the colony had increased to 265 nests or nearly six times the number present in 1941. A census of the contents of the 265 nests is as follows:

	Nests	*Eggs and young*
Nests empty or under construction	13	—
Nests with eggs or young: One	16	16
Two	46	92
Three	137	411
Four	52	208
Five	1	5
Total	265	732

Of the above 265 nests, 12 contained young ranging from freshly hatched chicks to some four or five days old. Most of the nests are on a rocky outcrop of the highest part of the island where all of the nests were located in 1940–1942. In 1943 there were three new groups located on the soil at lower elevations of the island. This great influx of nesting birds is probably a contribution from nearby Marblehead Island.

Marblehead Island; 44° 2.1′ N., 69° 2.8′ W.

Marblehead is a small, almost conical, rocky ledge situated about a half mile south of Fisherman's Island. There is no vegetation and

it is completely taken over by the cormorants except for a few Herring Gulls and Black Guillemots which persist in nesting there. It is a picturesque colony, with nests placed on numerous terraces right up to the summit of the rock. This is one of the older colonies and it is not known when the birds started nesting there, but when Norton and Allen visited the ledge in 1931 it was already a well established colony with a population of 600 breeding adults. According to Mendall (1936), who made his life history studies on this island, the numbers were the same in 1933 but increased to 700 in 1934 and 1935. On June 1, 1943, Mr. J. Gashwiler and myself counted 793 nests which represent a population of more than double that reported by Mendall in 1934–1935. Time did not permit taking a complete census, but a sample of 177 nests of a typical section of the colony contained the following: three nests under construction, five nests with one, 34 nests with two, 83 nests with three, and 52 nests with four eggs or young. Of the above sample of 177 nests, 59 contained young ranging from those freshly hatched to some approximately ten days old.

Crescent Island; 44° 1.3′ N., 69° 2.2′ W.

Crescent Island is situated in lower West Penobscot Bay about one and one-half miles south of Fisherman's Island. According to Norton and Allen, it was merely a roosting place for the cormorants in 1931. In 1934, Mendall (1936) found 78 breeding birds there but they deserted the island the following year. In 1943, the birds were again nesting and from our boat we estimated that there were at least 100 nests.

Yellow Ridge; 43° 58.8′ N., 69° 6.8′ W.

This rocky island, situated in Muscle Ridge Channel, was visited by Norton and Allen in 1931, but they make no mention of cormorants roosting or nesting there. On May 31, 1943, from our boat I estimated a colony of about 150 nests. Because of the heavy sea we were unable to land on this ledge or on Crescent Island mentioned above.

Metinic Green Island; 43° 57.8′ N., 69° 8.2′ W.

This island is situated south of Metinic Island. In addition to its large population of Herring Gulls, it now also supports a large, prosperous cormorant colony. The island is well turfed with grass and there are numerous patches of weeds and raspberry vines but no trees or shrubs. There were no cormorants on this island from 1931 to 1936. Mr. Jack Perkins of the U. S. Fish and Wildlife Service reported finding a large colony on June 7, 1942, but he made no

count or estimate of the numbers. On May 31, 1943, we counted 932 nests which contained the following:

		Nests	*Eggs or young*
Nests empty or under construction		58	—
Nests with eggs or young:	One	37	37
	Two	108	216
	Three	438	1314
	Four	288	1152
	Five	3	15
	Total	932	2734

Among the 932 nests, 57 contained young ranging in age from those just hatched to others about eight days old. Most of the nests were built on the ground but some of them were on the exposed rocks near the sea wall.

Metinic Green Island, if undisturbed, is destined to become the largest cormorant colony on the Maine coast. At the height of the nesting season there is probably a breeding population of 2,000 individuals, and on this large island there is an abundance of room for future expansion. Only the number of nests found on Colt Head Island in 1942 (1,253 nests) exceeds the number found on Metinic Green in 1943.

Hay Ledge; 43° 54.6′ N., 69° 14′ W.

This island is south of Martinsville near the Brothers Islands. On May 31, 1943, there were about 200 cormorants roosting on the island. We were unable to land, but from Brothers Islands we could see at least a dozen nests on the higher outcroppings of rock. As far as I have been able to ascertain, this is the first year that the cormorants nested on this ledge.

Little Egg Rock; 43° 51.4′ N., 69° 20.5′ W.

This island lies in the southeastern part of Muscongus Bay. When we passed this island on May 31, 1943, it was inhabited by a large number of cormorants but we were unable to make a census. Fortunately, members of the National Audubon Nature Camp have made careful counts of the numbers of birds. From 1936 to 1941 the numbers of nesting pairs were 300, 300, 374, 464, 455, and 488, respectively.

Old Hump Ledge; 43° 52.6′ N., 69° 21.5′ W.

Old Hump Ledge is situated in Muscongus Bay a little less than two miles northwest of Little Egg Rock. On July 12, 1931, Norton and Allen reported seeing 150 cormorants, including a few *Phalacrocorax carbo.* There were four occupied nests of the Double-crested

Cormorant which mark the beginning of this nesting colony. H. L. Mendall (1936) reported a population of 200 nesting cormorants in 1933, 350 in 1934, and 400 in 1935. The representatives of the National Audubon Nature Camp counted 135, 188, 264, 331, 337, 367, and 371 nesting pairs for the years 1936 to 1942, respectively.

Long Ledge; 43° 53.3′ N., 69° 22′ W.

Long Ledge is one of a group of small rocky ledges situated about a mile northwest of Old Hump Ledge. Allen and Norton found 60 cormorants roosting on this ledge in 1931. I saw 50 to 100 of the birds roosting there in 1941, 1942, and 1943, but at the time of the visits there were no nests. However, in 1943, several adults were observed to be carrying and playing with sticks such as are used in nest building and it may be only a matter of time until a nesting colony will be established.

Shark Island; 43° 50.8′ N., 69° 21.5′ W.

Shark Island is the outermost island of the Muscongus Bay group, situated about two miles due south of Old Hump Ledge. It is a barren, rocky island with just a few scant bunches of grass and low-growing weeds on the narrow plateau of the central portion. There were no cormorants nesting on Shark Island when Norton and Allen visited the island on July 12, 1931. The counts made by the National Audubon Society Nature Camp are 142, 142, 367, 548, 524, and 540 nesting pairs of cormorants for the years 1936 to 1941, respectively.

On May 31, 1943, we counted 905 nests—nearly double the number found by the National Audubon Society, indicating a tremendous increase in the Shark Island colony in the last year. A conservative estimate places the colony at 2,000 individuals at the height of the nesting season. This colony is a close second to the one on Metinic Green from the standpoint of the number of cormorants. At the time of our visit on May 31, 1943, there were no young. A sample census of all the nests in a typical area comprising 110 nests revealed the following contents: two nests empty, five with one, 22 with two, 48 with three, 32 with four, and one nest with five eggs. In the 110 nests there were 330 eggs or an average of three eggs per nest, which is representative of the entire colony.

Western Egg Rock; 43° 52.7′ N., 69° 25′ W.

Western Egg Rock is situated in the western part of lower Muscongus Bay, about three miles east of New Harbor, Maine. It is a low, heavily turfed island with a rank growth of grass interspersed with wild parsnips, clover, nettles, and dense patches of raspberries

and wild roses. There is much debris along the shores and a high sea wall of rocks and boulders. There were no cormorants nesting on this island in 1931–1932, although a few were found roosting there. In 1936, the National Audubon Society Nature Camp reported 40 pairs of nesting birds, which apparently mark the beginning of this colony although a few may have nested there prior to 1936. The National Audubon Camp also reported 91, 107, 149, 138, 249, and 250 nesting pairs for the years 1937 to 1942, respectively.

On May 30, 1943, we found the main colony established among the giant boulders and slabs of rock and among the debris cast up by the storms on the southwest side of the island. There were also two smaller groups about 150 yards apart on the extreme western side of the island. A complete census of the contents of the 614 nests found at that time is as follows:

	Nests	*Eggs*
Nests empty or in stages of construction	62	—
Nests containing eggs: One	47	47
Two	110	220
Three	251	753
Four	141	564
Five	3	15
Total	614	1599

White Islands; 43° 47.5′ N., 69° 34.6′ W.

The White Islands are situated due south of the mouth of the Damariscotta River and southeast of Ocean Point, Maine. There are two islands of which the northern one is occupied by the cormorants and Herring Gulls. A large part of this island is covered with a dense, luxuriant vegetation: beach plum thickets, numerous large patches of nettles, yarrow, dandelions, parsnips, and other herbaceous plants. There are also heavily turfed areas of grass, but the margin of the island is barren and rocky. There are about 30 standing dead spruce trees and many fallen and partially decayed tree trunks and jagged stumps.

On July 13, 1931, Norton and Allen found 600 Herring Gulls breeding on the northern island but there were no cormorants and there were none when I visited the island on June 6, 1935.

On June 4, 1941, there were 187 cormorant nests, all of which were placed in the 55 dead spruce trees which were standing that year. All of the nests that could be examined contained eggs. Five eggs taken from that many nests were fresh or with incubation only slightly advanced. There were considerable numbers of cormorants roosting

on the rocky margins of the island as we approached, but there were no nests on the rocks or on the ground.

On June 6, 1942, Jack Perkins found an increase over the number of nests found the previous year, with a group on the rocks in addition to those built in the dead trees.

When I visited the island on May 30, 1943, there was a total of 474 cormorant nests even at that early date. Of the 474 nests, only 218 were built in the remaining 30 dead spruce trees and 256 were on the rocks, the barren ground, or else on the fallen tree trunks. It was impracticable to include in the census the nests located in the dead trees, because of their precarious positions, but the 256 nests in accessible places on the ground and rocks or the fallen tree trunks contained 784 eggs distributed as follows:

	Nests	*Eggs*
Empty nests or nests under construction	16	—
Nests with eggs: One	7	7
Two	27	54
Three	102	306
Four	103	412
Five	1	5
Total	256	784

None of the nests contained young at the time of the census, May 30, 1943, but some of the eggs were in well advanced stages of incubation.

Pumpkin Island; 43° 45.2′ N., 69° 35′ W.

Pumpkin Island is situated about three miles south of the White Islands and a mile and one-half east of the southern tip of Damariscove Island. It is a high, rocky island and there are no trees but the higher parts of the island are turfed with grass and small weeds. On the rocky extensions and numerous reefs, much of which is covered at high tide, is a flourishing colony of seals. We counted 50 adults and six pups from one vantage point, but there are probably a hundred individuals in the entire herd.

Norton and Allen found 300 Herring Gulls and some Leach's Petrels nesting on the island on July 13, 1931, but there were no cormorants at that time. According to Mr. Joseph Fisette, the cormorants first appeared on the island in 1936 when there were about a dozen nests built and occupied that season.

When I visited the island on June 4, 1941, there were 489 nests which were disposed in four nearly equal groups well separated from one another. The nests of the group established on the highest eleva-

tion contained young ranging from a day to ten days old. Since the incubation of the cormorant is 25 days, this one group must have started nesting the last week of April. The other three groups had nests which contained eggs, most of which were in their early stages of incubation. Jack Perkins reported the colony flourishing when he visited Pumpkin Island on June 6, 1942. There were well advanced young in some of the nests at that time.

On May 29, 1943, there were 873 nests; the colony had practically doubled its numbers since my previous visit on June 4, 1941. There were no young in any of the nests at the time of this visit. A complete census of the 873 nests is as follows:

	Nests	*Eggs*
Empty nests or nests under construction	88	—
Nests with eggs: One	35	35
Two	92	184
Three	315	945
Four	340	1360
Five	3	15
Total	873	2539

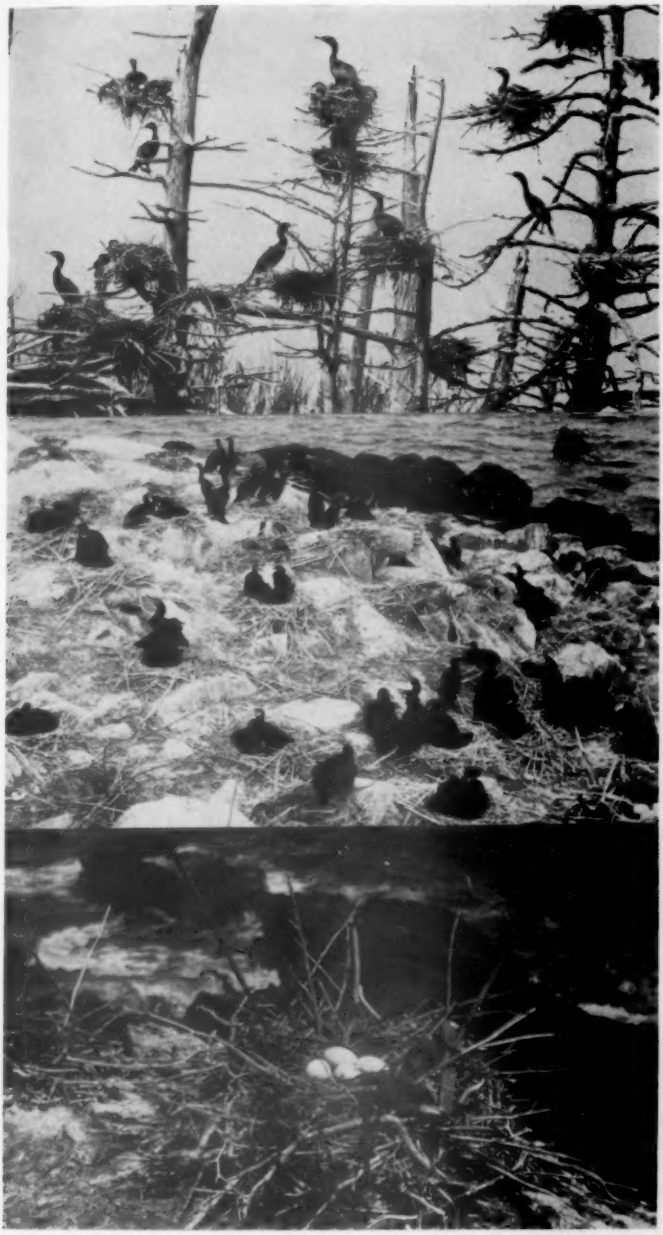
When Mr. Guy Gashwiler visited the island on June 17, 1943, many of the cormorant eggs had hatched and a few of the young were old enough to have acquired well-developed feather papillae.

In addition to the cormorants the island supports a population of 2,800 Herring Gulls. There were eight nests of the Black-backed Gulls and several Black Guillemots were seen offshore, but lack of time prevented us from discovering their nests.

Heron Islands; 43° 43.2′ N., 69° 48.3′ W.

The Heron Islands are situated midway between the mouth of the Kennebec River and Small Point. There is in reality but one island that is cut by two deep clefts dividing it into three distinct parts. It is covered over with turf but there are prominent outcroppings of rock. On the northern section there is a small group of dead spruces which are rapidly disappearing. Today there are only a half dozen of the trees that have managed to weather the storms and to resist decay.

There were no cormorants on the island in 1931. In 1932 and 1933, cormorants roosted on the island but none of them nested. On June 5, 1935, I found 25 nests in the dead spruces of the northern section and 12 on a large rocky outcrop of the southern section. By 1941, the spruces were no longer suitable for nesting sites and all of the cormorants moved to the treeless southern section. On June 4,



DOUBLE-CRESTED CORMORANT.—(*Top*) NESTING IN DEAD SPRUCES OF NORTHERN WHITE ISLAND, MAY 30, 1943. (*Middle*) FOUR OF THE 265 NESTS ON FISHERMAN'S ISLAND, JUNE 1, 1943. (*Bottom*) A SECTION OF THE MARBLEHEAD ISLAND COLONY, JUNE 15, 1944. A FEW NESTS CONTAINED EGGS BUT MOST HELD YOUNG IN ADVANCED STAGES OF DEVELOPMENT.

1941, there were 77 nests with the following contents: 29 nests were empty or under construction, 11 contained one egg, 17 contained two eggs, 12 contained three, and eight nests contained four eggs each. There was one Herring Gull nest containing one egg of the gull and two eggs of the cormorant which were being incubated by the cormorant.

When we visited the island on June 1, 1942, there was abundant evidence that the colony had been seriously molested. There were several Herring Gulls and cormorants that had been shot and a number of the cormorant nests were torn apart and the eggs broken. In spite of these depredations there were 61 nests, 49 of which contained eggs.

On May 28, 1943, there were 244 cormorant nests, all on the southern section of the island, as follows:

	Nests	*Eggs*
Empty nests or nests under construction	49	—
Nests with eggs: One	21	21
Two	38	76
Three	78	234
Four	57	228
Five	1	5
Total	244	564

There were no young on May 28, but when the island was visited on June 16 the number of nests had increased to about 300, of which only a few were incomplete or empty. There were many young, some of them with the juvenal plumage well developed. In addition to the cormorants there were 3,000 Herring Gulls and 38 Black-backed Gulls nesting on the island in 1943.

White Bull Island; 43° 43.1′ N., 69° 55.5′ W.

White Bull is one of the outer islands of the eastern end of Casco Bay. It is a rocky island with bold, abrupt shores which make landings in rough weather extremely difficult. The vegetation is limited to a small area containing beach plum, blue grass, ragweed, yarrow, shepherd's-purse, and similar plants. There are no trees or large shrubs.

There were no cormorants on White Bull during 1931–1935. A varying number of the birds used it as a roosting place during the seasons 1936 to 1938, but none nested at that time. On June 4, 1941, we found that about 50 pairs of cormorants had established a nesting colony. On June 1, 1942, there were 99 nests in the colony which contained the following: 31 nests under construction, nine with one,

11 with two, 23 with three, and 25 with four eggs each—a total of 200 eggs.

On June 14, 1943, there were 209 nests or about double the number in the colony during the preceding year. The contents of the 209 nests were as follows:

	Nests	*Eggs and young*
Empty nests or nests under construction	7	—
Nests with eggs or young: One	8	8
Two	25	50
Three	82	246
Four	87	348
Total	209	652

Of the above 209 nests, 33 contained one or more young, the majority of them just hatched or only a few days old. In addition to the cormorants, this island supports a Herring Gull population of nearly 2,000. Twelve Black-backed Gulls also use the island as a nesting place.

West Brown Cow Island; 43° 41.8′ N., 70° 4.6′ W.

West Brown Cow is one of the outer islands of middle Casco Bay, between Jewell and Eagle islands. It is a relatively high, rocky islet and like White Bull Island it is difficult to land there except in calm weather. The vegetation is extremely scant—just a few tufts of grass and low-lying plants. There are a few dead stubs of small trees still standing among the cormorant nests. The framework of a geodetic survey marker was still standing on the highest portion of the island in 1943 which serves well in identifying the island.

The cormorants had established a small colony on the island when we landed there on June 2, 1942. As far as I know, this constitutes the first record of their nesting on West Brown Cow. The contents of the 42 nests were as follows: Nests under construction 15, six nests with one, three with two, eight with three, and ten with four eggs each. At the time of our visit to the island on May 20, 1943, there were 152 nests—more than three times the number in 1942, although it was nearly two weeks earlier in the season. The contents of the nests were as follows:

	Nests	*Eggs*
Nests under construction	62	—
Nests with eggs: One	18	18
Two	17	34
Three	31	93
Four	21	84
Five	3	15
Total	152	244

Outer Green Island; 43° 39′ N., 70° 7.5′ W.

Outer Green Island lies in the outer southern portion of Casco Bay, about three miles east of Peaks Island in Portland Harbor. It is a high island with a somewhat level plateau which is well turfed with a rank growth of grass and herbaceous plants. In a central depression filled with rich soil there are thick patches of nettles and shrubs growing about four feet high. There are several prominent rocky outcrops and barren areas which are occupied by the cormorants.

Cormorants have roosted on Outer Green for a number of years, but as far as I have been able to determine, the first record of their nesting was made when we visited the island on June 2, 1942. At that time the nests were in two nearly equal groups, one comprising 25 nests at the southern end and one of 26 nests on a rocky outcrop near the center of the island. All of the nests contained eggs.

When we visited the colony on May 20, 1943, most of the nests were built on the top of the high ledges at the southeastern side of the island. At the extreme southern end we saw about 35 adult cormorants roosting and a small nucleus of 14 nests, 11 in a state of construction, two nests with one egg, and one nest with two eggs. There were 231 nests in the main colony with contents as follows:

	Nests	*Eggs*
Nests under construction	43	—
Nests with eggs: One	14	14
Two	21	42
Three	38	114
Four	102	408
Five	13	65
Total	231	643

Considering the fact that our visit in 1943 was nearly two weeks earlier than the year before, the counts reveal that this colony had increased its size to five times in the course of one year. From one vantage point on the island I counted 535 adult cormorants on the water or flying near the surface.

In addition to the cormorants there is a population of 2,200 Herring Gulls and 20 Black-backed Gulls nesting on the island. In the tall weeds and shrubs in the central depression we saw a female Chewink, a male Bobolink, a male Northern Yellow-throat, a Field Sparrow, and five Savannah Sparrows. Some of the above birds—at least the Savannah Sparrows—were nesting, but we did not have the time to hunt the nests.

Junk-of-Pork; 43° 38.9′ N., 70° 7.4′ W.

Junk-of-Pork lies southeast of, and near to, Outer Green Island. At very low tides a rocky reef connects the two islands. It is a very abrupt, rocky island surrounded by nearly perpendicular walls 30 to 40 feet high. There is practically no vegetation on the flat top which is covered by a deep incrustation formed chiefly from the excrement of the sea birds. As in the case of Outer Green Island, the cormorants used Junk-of-Pork as a roosting place during the summer months, even many years before Outer Green was used for that purpose. I have no record of the year when the birds first nested there but when we visited the island on June 2, 1942, there was a well-established colony consisting of 88 nests containing 319 eggs and 11 young.

	Nests	*Eggs and young*
Empty nests	1	—
Nests with eggs or young: One	1	1
Two	3	6
Three	18	54
Four	56	224
Five	9	45
Total	88	330

Apparently, nesting activities started earlier in the season than at most of the other colonies, for on June 2 most of the sets were complete, no nests were in stages of construction, and there were 11 young. Nesting must have been under way during the latter part of April. There were 30 nests of the Herring Gull, most of which were placed among the nests of the cormorants. Even in these close quarters the two species seemed to exist in harmony.

Bluff Island; 43° 30.5′ N., 70° 19.2′ W.

Bluff Island is situated in Saco Bay, three miles east of Old Orchard Beach and one and one-half miles south of Prout's Neck. It is a large, dome-shaped island which is turfed over with a very rank growth of timothy grass. There are no trees or shrubs but along the

inner margins of the sea wall there are masses of tall weeds and herbaceous plants.

On the northeastern end of the island there is a rocky headland on which a number of cormorants roosted during the seasons of 1940 and 1941, but none of them nested until 1942. On May 29, 1942, there were about 50 cormorants roosting on the headland and a small group of 13 nests in various stages of construction—one nest with two fresh eggs. On June 23, 1942, all 14 nests contained eggs. A year later, on May 23, 1943, the colony had increased in size to 62 nests with contents as follows:

		Nests	*Eggs*
Nests under construction		26	—
Nests with eggs:	One	9	9
	Two	11	22
	Three	7	21
	Four	8	32
	Five	1	5
	Total	62	89

In the early part of the present century, Bluff Island was a Common Tern colony, but since that time the terns have been completely replaced by gulls. Today it is one of the largest Herring Gull colonies on the coast, providing nesting sites for 5,800 individuals. There are also several Black-backed Gulls breeding on the island.

Eagle Island; 43° 28.8′ N., 70° 21.6′ W.

Eagle Island is situated a mile and a quarter east of Ferry Beach, Saco, Maine, and about a mile north of Ram Island. It is a small but high island with bold outcroppings of rock cut by deep, abrupt clefts. There is a very striking exposed dyke that has withstood erosion and stands out prominently like an immense man-made wall. There are extensive rocky reefs on one side of the island that serve as a breeding place for a considerable number of seals. On June 29, 1942, we counted 78 adult seals and found five newly born pups on the rocks as we went ashore. The high, jagged rocks at the eastern end of the island have served as a roosting place for the cormorants but none of them nested up to 1942. We were unable to make a landing on the island when we visited the region on May 23, 1943, because of the rough sea, but as we circled the island in the motorboat we counted 75 adult cormorants on the rocks and with the aid of binoculars we could see at least a dozen nests, establishing the first nesting record for this island.

Duck Island; 43° .3′ N., 70° 36.3′ W.

Duck Island is the most northern member of the Isles of Shoals group and is situated about eight miles southeast of Portsmouth, New Hampshire. It is about a mile north of Appledore Island which also lies on the Maine side of the Maine-New Hampshire state boundary line.

Duck Island is turfed over but there are numerous and conspicuous outcroppings of rocks. In some of the depressions there are fresh water pools surrounded by tall, rank grass and weeds. There are also several patches of raspberries but no trees or shrubs. When we visited the island on May 26, 1942, there were about 50 cormorants perched on neighboring Shag Rock, a ledge off the southeastern end of the island. According to Dean Jackson, Director of the University of New Hampshire Biological Station, Isles of Shoals, cormorants have roosted on Shag Rock each summer for a long period of years but he had never known them to nest there. The name of the ledge may have originated from the fact that it was a gathering place for shags.

When Mr. Jay Gashwiler of the U. S. Fish and Wildlife Service visited Duck Island on June 19, 1943, he reported two groups of nesting cormorants established on rocky elevations protruding above the general level of Duck Island. The two sites were about 200 feet apart. There were eight nests at the northern site and ten at the southern location. Several of the nests were in process of construction and others contained fresh eggs. This is the first year they have nested in that region. Duck Island is the most southern and western colony of cormorants in Maine and with the establishment of this colony in 1943 it can be said that the cormorant is present as a nesting species along the entire coast of Maine. As previously stated, the cormorant has also recently extended its nesting range to the coast of Massachusetts.

The underlying biological and ecological factors which have determined this unprecedented increase of the cormorant in the course of a few years while previously it remained dormant as a nesting species on the New England coast for so many years, presents an interesting problem.

Since this paper was written and submitted, visits were made to most of the Maine colonies of cormorants during the season of 1944. The number of nesting cormorants has increased in the majority of the colonies since 1943 as shown in the following condensed table giving the number of nests counted during each of the two years. This year (1944) we found a colony of 157 cormorant nests on Robinson Rock, 44° 9.7′ N., 68° 58.7′ W. and there were 32 occupied nests

on Downfall Island, 44° 10.8′ N., 68° 58.7′ W., the first time these birds have nested there. We also have reports from reliable sources that there are now well-established colonies of cormorants on Green Ledge, 44° 4′ N., 68° 55.3′ W., Medric Rock, 44° 3.8′ N., 68° 56′ W., and the Hay Islands, 44° 1′ N., 68° 47.8′ W. If we include the latter, we now have 32 known cormorant colonies on the coast of Maine with well over 10,000 pairs of nesting birds. There are probably other colonies which have thus far escaped our attention.

In the following table, the order of the islands is the same as that presented in the text. To assist the reader in locating the various islands, the names of the U. S. Geological Survey quadrangles are also given.

U. S. G. S. Quadrangle	*Islands*	*Number of nests* 1943	1944
CUTLER	Old Man Island	333	350
MACHIAS	Brothers Islands	6	—[1]
	Pulpit Rock	100[2]	155
GREAT WASS ISLAND	The Ladle	10	—[1]
DEER ISLE	Black Horse Island	75	—[3]
CASTINE	Colt Head Island	870	825
VINAL HAVEN	Spoon Ledge	728	565
	Robinson Rock	—	157
	Downfall Island	—	32
ROCKLAND	Fisherman's Island	265	518
	Marblehead Island	793	805
	Crescent Ledge	100[2]	150
TENANTS HARBOR	Yellow Ridge	150[2]	175
	Metinic Green Island	932	1014
	Hay Ledge	12	220
MONHEGAN	Little Egg Rock	500[2]	434
	Old Hump Ledge	400[2]	513
	Shark Island	905	932
	Western Egg Rock	614	746
BOOTHBAY	White Islands	474	522
	Pumpkin Island	873	—[3]
SMALL POINT	Heron Islands	244	398
	White Bull Island	209	482
CASCO BAY	West Brown Cow Island	152	—[3]
	Outer Green Island	231	—[3]
	Junk-of-Pork Island	150	—[3]
PORTLAND	Bluff Island	62	158
BIDDEFORD	Eagle Island	12	—[3]
PORTSMOUTH	Duck Island, Isles of Shoals	18	37

[1] Cormorants present but no nests at the time of visit in 1944.
[2] Estimated.
[3] Not visited in 1944.

Because of the increase in the number of complaints of damage, especially by the weir fishermen of eastern Maine, the U. S. Fish and Wildlife Service, through an agreement with the Maine Department of Inland Fisheries and Game, has undertaken the task of controlling the cormorants, beginning this past season (1944). The eggs were sprayed with an oil emulsion to prevent hatching—a method found successful in the control of the Herring Gull. It is expected that these measures will be continued. No effort is being made to exterminate the cormorants but it is merely an effort to check the tremendous increase of these birds and to reduce their numbers until they no longer prove to be a serious menace to the weir fishermen. The U. S. Fish and Wildlife Service has adopted an effective but humane method of control which has the distinct advantage of not interfering with other species of birds such as the American Eiders which nest on many of the same islands occupied by nesting cormorants.

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Brunswick
Maine

THE RACES OF THE SOLITARY SANDPIPER

BY BOARDMAN CONOVER

WHILE it has been known for some time that there are two races of the Solitary Sandpiper, *Tringa solitaria,* there has always been confusion, not only as to the ranges and breeding areas of the two forms, but also as to the characters separating them. In fact, Swarth (Condor, 37: 199, 1935), after examining a series from Atlin, British Columbia, expressed disbelief in the so-called western race *cinnamomea,* taking issue with Taverner and Sutton (Ann. Car. Mus., 28: 38, 1934) who had identified six specimens from Churchill, Manitoba, as be-

longing to it and who had suggested on the basis of a female taken on June 8 with an egg almost ready to be laid, that the race might be a northern rather than a western one.

Hoping to clear up some of these questions, I recently borrowed a number of specimens taken throughout Canada and Alaska during the spring and summer. A study of these, together with specimens in breeding plumage in my own collection, has led me to the following conclusions:

1. There are two races of *Tringa solitaria*.
2. Adult specimens of the two forms in fresh, unfaded breeding dress are readily distinguishable by the difference in coloration of their upper parts. This character to the best of my knowledge has never been mentioned before.
3. In fresh immature plumage, the young can be identified in the same manner, as well as by the difference in the coloration of the spotting of the dorsal surfaces.
4. The race *cinnamomea* is distinctly larger as shown by its wing measurements and this character holds good in the immature birds.
5. There are certain other characteristics, such as the white mottling on the inner web of the outer primary, which, while not constant, are of great help in identifying specimens.
6. Typical *solitaria* is not an eastern but a southern race and breeds across the continent from the interior of British Columbia east to Labrador, while *cinnamomea* breeds north of it, but west of Hudson Bay.

Below, these points are discussed more in detail.

Tringa solitaria solitaria Wilson

Tringa solitaria Wilson, Amer. Orn., 7: 53, pl. 58, fig. 3, 1813—Pocono Mt., Pennsylvania, Kentucky, and New York = Pocono Mt., Pennsylvania.

RANGE.—Breeds from northern British Columbia, northern Alberta (Wood Buffalo National Park), central Saskatchewan, central Manitoba (Ilford), northern Ontario (Moosonee) and Labrador (Flower's Bay, near Hopedale) south probably to about fifty degrees north latitude. Migrates through the United States (mostly east of the Rocky Mountains), the West Indies and Central America to southern South America (Bolivia, Paraguay, and northern Argentina).

Among the specimens examined were a few which gave evidence of actual nesting localities for this race. These localities are as follows: Alberta, Didsbury, specimen "shot flying off of nest with three eggs"; Manitoba, Ilford, two juvenile specimens three-quarters grown, shot on July 21 and 22; Ontario, Moosonee, Kwataboahegan River, three

immatures with outer primaries not quite fully grown (shot July 20); Labrador, Flower's Bay (near Jack Lane's Bay, north of Hopedale), a pair collected with a nest of four eggs. Besides, I have seen a downy young, taken at Henry House, Alberta, which probably belongs to this race.

BREEDING PLUMAGE.—The ninety-three specimens listed below were taken from March through July. Some fifty-four were collected before June 30 and therefore are mostly in comparatively fresh breeding dress. These, when compared to a like series of *cinnamomea*, show that typical *solitaria* has the ground color of the upper parts duskier and, on the average, more heavily spotted with white. This latter characteristic, however, only becomes apparent in a large series. Under the next race, this difference in coloration is discussed in greater detail.

Examination of these birds shows that in this race the outer wing feathers are generally immaculate, but that about one bird in nine or ten has some indication of white mottling on the inner web of the outermost primary. In this series of ninety-three, seven had these markings slight and one heavy.

This form is smaller. In males the wing measured 123–132.5 mm. (average, 127.5), culmen, 27–32 (average, 28.8); while in females these measurements were 127–140 (average, 132.5) and 28–31.5 (average, 29.9), respectively. However, the maximum measurement of 140 mm. in females is a bit deceiving, as there was only one bird with such a wing-length; the next largest was 136 of which there were five examples. This latter measurement is just under the minimum of 137 mm. for females of *cinnamomea*.

SPECIMENS EXAMINED (BREEDING DRESS).—93: ALASKA (Griffin Point, Arctic Ocean, 1*); BRITISH COLUMBIA (Atlin, 1; Cariboo, 1); ALBERTA (Wood Buffalo Park, 4; Fort McMurray, 2; Lac la Nonne, 3; Didsbury, 1; La Saline, 1); SASKATCHEWAN (Big River, 1; Emma Lake, 1; Maple Creek, 2); MANITOBA (Ilford, 13; Bird, 1; Lake St. Martin, Indian Reserve, 1); ONTARIO (Favourable Lake Mine, 6; Lowbush Lake, Abitibi, 1; Moosonee, Kwataboahegan River, 3; vicinity of James Bay, 6); QUEBEC (Ft. Chimo, Ungava, 1); LABRADOR (Bowdoin Harbor, 1; Flower's Bay, north of Hopedale, 2); NORTH DAKOTA (Towner County, 2); MISSOURI (Koshkonong, 1); WISCONSIN (Beaver Dam, 3); ILLINOIS (Grand Chain, 1; Chicago, 5; Wheaton, 2; Libertyville, 1; Joliet, 3); OHIO (Circleville, 1); NEW HAMPSHIRE (Ossipee, 1); CONNECTICUT (New Haven County, 4; East Hartford, 2); NORTH CAROLINA (Dare County, 2); SOUTH CAROLINA (Mt. Pleasant, 2); GEORGIA (Chatham County, 1); FLORIDA (Brevard County, 1); DOMINICAN REPUBLIC (San Luis, Santo Domingo, 2); MÉXICO (Río Lagartos, Yucatan, 1); COSTA RICA (Limón, 1; Las Cañas, 1); COLOMBIA (El Tambo, Cauca, 1); VENEZUELA (Maracay, 1); DUTCH WEST INDIES (Curacao, 1).

* This bird, a female with a wing of 129 mm., of course is far out of the range, not only of the race, but also of the species.

IMMATURE PLUMAGE.—Examination of the specimens listed below shows that in this plumage the ground color of the dorsal surface in the typical race is near a dark Hair Brown, less olivaceous than in *cinnamomea*. The spotting of the upper parts is white or grayish white. The dusky coloring of the lower throat generally takes more the form of a wash than longitudinal streaks, but this is not always so.

In these fifty-nine typical examples, one has the outer primaries slightly mottled; the rest have them immaculate.

Measurements of these specimens are, for males: wing, 123–132 mm., culmen, 26–30.5; females, wing, 126–136, culmen, 26–31.

SPECIMENS EXAMINED (IMMATURES).—59: YUKON TERRITORY (Echamamish, 1); BRITISH COLUMBIA (Okanagan, 11); ALBERTA (Lac la Nonne, 10; Wood Buffalo Park, 3); SASKATCHEWAN (Maple Creek, 2); MANITOBA (Ilford, 2); ONTARIO (Moosonee, Kwataboahegan River, 2); QUEBEC (Magdalen Islands, 1); NORTH DAKOTA (Nelson County, 7); WISCONSIN (Beaver Dam, 1; Fox Lake, 1); MASSACHUSETTS (East Orleans, 1); CONNECTICUT (East Hartford, 1; Grove Beach, 1; Guilford, 1; New Haven County, 7); NEW YORK (Suffolk County, 5); LESSER ANTILLES (Dominica, 2).

Besides the above skins, there were seven immature specimens which I would class as intermediates. Six had the dorsal surface more or less olivaceous as in *cinnamomea* but with the spotting very light buffy, in one case almost white. In size, they agreed with the typical race, with the wing in the males measuring 123–126 mm.; in females, 122–131. Four had the outermost primaries immaculate; one had them slightly and one heavily mottled. The seventh example (from Moose Pass, British Columbia) was an astonishing bird in this respect for not only were all the primaries mottled with white, but the secondaries as well. It was a male (wing, 123 mm.) with the coloration of the dorsal surface as in typical *solitaria* but with the white spots washed with buff. The localities for the other six ran from Ontario and Iowa west to British Columbia and California.

WINTER PLUMAGE.—The Solitary Sandpiper does not appear to have a distinct winter plumage. Adults seem to molt some time in January from the old, worn and faded breeding dress of the previous spring into a fresh one. Immatures at about the same time start changing into their first adult dress. However, as only a few of the specimens examined were taken in the late winter, the picture is none too clear. A list of the fall and winter specimens is included so as to give an idea of the migration route and wintering grounds.

SPECIMENS EXAMINED (FALL AND WINTER).—56: NORTH DAKOTA (Towner County, 2; Nelson County, 2); WISCONSIN (Beaver Dam, 2); ILLINOIS (Libertyville, 1; Lake County, 1); Worth, 2); MAINE (Penobscot County, 2); MASSACHUSETTS (Monomoy Island, 1); CONNECTICUT (New Haven County, 4; East Hartford, 1); NEW YORK

(Kings County, 1); PENNSYLVANIA (Tioga, 1); COSTA RICA (Guanacaste, 1); PANAMÁ (Chiriquí, 2; Permé, 1); GREATER ANTILLES (Jamaica, 1); VIRGIN ISLANDS (St. Croix, 1); LESSER ANTILLES (Dominica, 1; Guadeloupe, 1); COLOMBIA (Cauca, 2); VENEZUELA (Catatumbo, 6; Encontrados, 1; Culata, Mérida, 2); ECUADOR (Baños, 1); DUTCH GUIANA (Paramaribo, 1); BRAZIL (Serra da Lua, Amazonas, 2; Boim, Pará, 1; Veadiros, Goyaz, 1; Quemada, Bahia, 1; São Paulo, 2; Chapada, Matto Grosso, 1; Vaccaria, Matto Grosso, 1; Urucum de Corumbá, Matto Grosso, 1); BOLIVIA (Buenavista, Santa Cruz, 2; El Palmar, Cochabamba, 1; Arque, Cochabamba, 1); PARAGUAY (Villa Rica, 1).

DOWNY PLUMAGE.—If the downy young bird taken at Henry House, Alberta, represents this form, there is no difference in coloration between the young of the two races.

Tringa solitaria cinnamomea (Brewster)

Totanus solitarius cinnamomeus Brewster, Auk, 7: 377, Oct., 1890—San José del Cabo, Lower California.

RANGE.—Breeds in Alaska and Canada from the limit of trees south to about 60° north latitude, and from Bering Sea to the west coast of Hudson Bay (Churchill). Migrates through the United States, mostly west of the Mississippi, and Central America to Bolivia, Paraguay and south-central Argentina (Río Negro). Rare on the Pacific coast of North America, north of southern California, and probably also in eastern South America.

Actual nesting localities for this race as shown by specimens examined are: Alaska (Circle, one downy young and two half-grown juveniles; Charlie Creek, on Yukon River above Circle, three downy young; Bethel, two immatures with outer primaries about two-thirds and three-quarters grown; Tocatna Forks, one immature with outer primary not fully grown, collected July 29); Northwest Territories (Mackenzie Delta, one female shot on June 1, label marked "egg inside"); British Columbia (Atlin, one female, collected May 23, label marked "egg three-quarters ready to lay"); Manitoba (Churchill, a female collected June 8, according to Taverner and Sutton contained an egg almost ready to be laid).

Besides the above there is, in the National Museum of Canada, a female, undoubtedly belonging to this race (upper parts grayish olive; wing, 143 mm.; outer primaries mottled), taken at Gypsumville, Manitoba, on June 18, which has the label marked "ovaries enlarged containing one nearly ready to lay." If this example was really nesting at this locality, it would seem to be far out of its normal range, as the typical race (see previous account) has been found nesting at Ilford, Manitoba, much farther to the north and east. Also, all the

other specimens examined from this province, both adult and immature, have proved to be *T. s. solitaria,* except those taken at Churchill.

BREEDING PLUMAGE.—In fresh, unfaded adult plumage, *cinnamomea* when compared to typical *solitaria* has the ground color of the upper parts lighter, more grayish as against more dusky olive. It is impossible to match these colors very closely in Ridgway's color chart, but *cinnamomea* might be said to have the dorsal surface between Hair Brown and Chaetura Drab while typical *solitaria* has it between Chaetura Drab and Chaetura Black. This character does not seem to have been mentioned before, but adults, when in fresh, unfaded plumage, can readily be identified by this difference in coloration. The upper parts of this race are, on the average, less heavily spotted with white and the dusky markings on the lower cheeks and throat are generally more distinct, but these characteristics are not very dependable and show up only in a large series. A better character, but still not an infallible one by any means, is the coloration of the lores. In the typical race there is usually a well-defined dusky loral streak from the base of the bill to the eye and above this a white supraloral one. *Cinnamomea,* however, usually lacks these streaks and has the loral region covered with fine dusky specklings.

About eighty-four per cent of the breeding adults examined had some mottlings on the inner webs of the outermost primaries. In the sixty-two listed below, ten had these parts immaculate, ten had them slightly mottled, and forty-two, heavily mottled.

This race is distinctly larger. In males the measurements are: wing, 128–139 mm. (average 134.65); culmen, 28–32 (average 30.5); females, wing, 137–148 (average 140); culmen, 29–34 (average 31.2).

To sum up, in adults in fresh, unfaded plumage the most constant racial characteristics of *cinnamomea* are the lighter olivaceous coloring of the dorsal surface, the length of wing (males 132 and females 137 mm. or over), and the white mottling of the outermost primary. By the presence or lack of these distinctions, specimens should be readily identifiable.

SPECIMENS EXAMINED (BREEDING DRESS).—62: ALASKA (Circle, 4; north fork Kuskokwim River, 1; Chitina River Glacier, 1; Bethel, 2; Tocatna, 1; Nulato, 2; Charlie Creek, Yukon River, 2); NORTHWEST TERRITORY (Finnie River, Thelon Sanctuary, 1; Mackenzie Delta, 4; Fort Simpson, 1; near Fort Providence, 1); YUKON TERRITORY (White Horse, 2; Yukon River, 1); BRITISH COLUMBIA (Atlin, 10; Cariboo, 1); ALBERTA (Lac la Nonne, 5; Edmonton, 1); SASKATCHEWAN (Maple Creek, 3); MANITOBA (Churchill, 6; Gypsumville, 1); CALIFORNIA (Yermo, 1); ARIZONA (Tucson, 2); COLORADO (Fort Lyon, 1); NORTH DAKOTA (Towner County, 3); WISCONSIN (Meridean, 1); ILLINOIS (Grand Chain, 1); EL SALVADOR (San Salvador, 1); COSTA RICA (Límón, 1; Miravalles, 1).

IMMATURE PLUMAGE.—In this race the ground color of the upper parts is more of an Olive Brown whereas in typical *solitaria* it is nearer a dark Hair Brown. The most distinctive feature, however, is the very buffy coloration of the spotting on the dorsal surface. This is a very constant character, at least through September, and wherever found serves to identify the individual as *cinnamomea*. After the beginning of October, however, the plumage is generally so faded and worn as to make identification impossible, except by the length of the wing and the mottling of the outer primary. In general this race also has the dusky coloring of the lower throat more in the form of longitudinal streaks than a wash as in typical *solitaria*. However, this is only an average character and of little use in identifying individual specimens.

Of the thirty examples studied that had the outer primaries fully grown, two had the inner webs immaculate, five had them slightly mottled, and twenty-three, strongly mottled.

Measurements were, in males: wing, 128–137 mm.; culmen, 27.5–31; in females, wing 134–145; culmen 27–32.

Immatures of this race, therefore, can be identified up through September by the very buffy spotting and Olive Brown ground color of the upper parts; after that only by the mottling on the outer primary (which if present is practically conclusive) and the length of the wing, which in the specimens examined usually ran above 132 mm. in males and 135 in females.

SPECIMENS EXAMINED (IMMATURE DRESS).—33: ALASKA (Bethel, 3; Tocatna Forks, 2; Circle, 2; Chitina River Glacier, 2; Situk River, Yakutat, 1); YUKON TERRITORY (60 mile Creek, 1); BRITISH COLUMBIA (Atlin, 4; Okanagan, 9; Shuswap, 3); ALBERTA (Lac la Nonne, 1; Henry House, 1); SASKATCHEWAN (Maple Creek, 2); COLORADO (Troublesome, 1); ECUADOR (Baños, 1).

DOWNY PLUMAGE.—The pattern of coloration is as in *Tringa flavipes*, but the general color of the upper parts is cinnamon drab instead of buffy gray.

SPECIMENS EXAMINED (DOWNY DRESS).—4: ALASKA (Charlie Creek, Yukon River, 3; Circle, 1).

WINTER PLUMAGE.—As stated under the typical race, this sandpiper does not have any winter dress, but adults wear the old worn breeding plumage until about January, when they molt into a new one. At about the same time immatures probably change into their first nuptial dress, but the winter specimens seen were too few to tell much about this molt.

SPECIMENS EXAMINED (FALL AND WINTER).—15: MASSACHUSETTS (Somerville, 1*); COLORADO (Fort Lyon, 1); TEXAS (Cameron County, 1); COSTA RICA (Volcan Turrialba, 1); ECUADOR (Paramba, 1; Baños, 1); PERÚ (Yurimaguas, Loreto, 1); BOLIVIA (Cercado, Santa Cruz, 3; Buena Vista, Santa Cruz, 1); PARAGUAY (Horqueta, 2; Chaco, 1); ARGENTINA (Tucumán, 1).

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Chicago
Illinois

THE STATUS OF BARROW'S GOLDEN-EYE IN THE EASTERN UNITED STATES

BY DR. EDWIN M. HASBROUCK

NUMEROUS writers in the last few years have suggested that the Barrow's Golden-eye (*Glaucionetta islandica*) "may be more common in eastern North America than generally supposed." In my studies of North American waterfowl I found this statement so frequently while a search of the literature failed to produce any concrete evidence on the subject, that it seemed advisable to investigate the matter and, if possible, ascertain something of the eastern status of this duck.

The great similarity of this species to the common American Golden-eye (*Glaucionetta americana*) may tend to hide the true status of the Barrow's. As Bent aptly states: "Outside of the Continental Divide in the northern states it is nowhere in this country an abundant species at any season. It is so rare throughout most of its American range that few ornithologists have seen it in life."

In addition to a careful search of the literature, over two hundred letters were sent to as many ornithologists throughout the eastern United States and Canada requesting information on the occurrence of this duck in each locality. These letters were sent out under the auspices of the United States National Museum, authorized by Dr. Alexander Wetmore and signed by Dr. Herbert Friedmann, Curator of Birds. Over a hundred replies were received, most of which contained valuable information; a few persons who replied (about twenty) knew practically nothing of the species.

In designating the area to be covered, an arbitrary western limit was set at Duluth, and only those records occurring at and east of

* This specimen is labeled as having been taken August 16, but it is in fresh, absolutely unworn breeding plumage, so that it is not a normal bird.

that city have been considered. Greenland and Iceland have been included. West of Duluth the center of abundance of the species appears to be the Rocky Mountain region of Montana west to British Columbia, in which latter region it is fairly abundant and a regular breeder.

The earliest eastern record is that of a specimen in the Dartmouth College museum taken about 1860, and from that date on, the records number 176, comprising over two thousand birds. The exact number is impossible to ascertain as many observers reporting sight records were unable to give a definite number for various reasons, such as "too rough water for an accurate count." Some gave such replies as, "five and others," showing that while at least five were present, others were also there but uncountable for some such reason as that mentioned. Again, some records are undoubtedly repetitions of the same duck seen on different days.

Altogether, however, the records of occurrences are many, and the presumption that the species is "more common in the eastern United States than commonly supposed" seems to be well founded.

These records are distributed over the following states, Canadian provinces, Greenland, and Iceland. For convenience in tabulating, I have adopted the method of giving the definite number as stated by the observer, followed by a '+' where more were indicated that for various reasons could not be counted; thus, 5+.

UNITED STATES

MAINE: 58 records, ranging from Oct. 24 to April 12.

NEW HAMPSHIRE: 4 records, only one with data.

VERMONT: 6 definite records, three of them '+' records ranging from fall of 1917 to Feb. 3, 1923.

MASSACHUSETTS: 244 records with fourteen '+' records, ranging from Nov. 5 to April 25.

RHODE ISLAND: 18 records and one '+' record, ranging from Dec. 26 to April 8.

CONNECTICUT: 12 records and one '+' record, ranging from Nov. 14 to March 21.

NEW YORK: 74 records, ranging from Nov. 23 to March 28.

NEW JERSEY: 2 records, ranging from Dec. 25 (Christmas census) to Feb. 5.

PENNSYLVANIA: 1 record, November.

MARYLAND: 2 records, about Dec. 20.

DISTRICT OF COLUMBIA: 1 record, Nov. 22.

NORTH CAROLINA: 3 records, February.

OHIO: 9 records, ranging from March 1 to April 5.

INDIANA: 4 records, ranging from Dec. 14 to March 10.

ILLINOIS: 2 records, Dec. and Jan. 2.

MICHIGAN: 12 records, ranging from Oct. 23 to April 1.

WISCONSIN: 5 records, ranging from Dec. to April 4.

MINNESOTA: 5 records, and two '+' records.

IOWA: 4 records; one on Oct. 11; three without data.

DOMINION OF CANADA

ONTARIO: 8 records, and one '+' record, ranging from Oct. 9 to April 4.

QUEBEC: 41 records, six '+' records, and one record of a flock of about 1500 ranging from Nov. 10 to May 15.

NEW BRUNSWICK: 12 records ranging from Dec. 15 to May 11.

NOVA SCOTIA: 9 records, two '+' records, ranging from Nov. 25 to April 4.

PRINCE EDWARD ISLAND: 2 records, spring of 1904.

LABRADOR

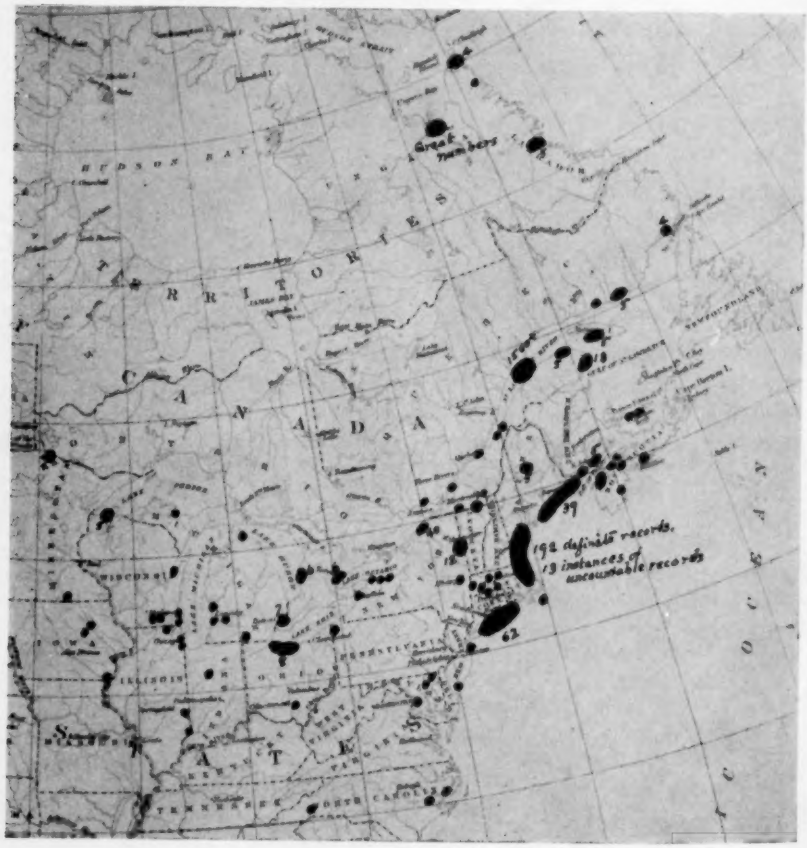
Twenty records ranging from Aug. 30 to spring; five are '+' records.

GREENLAND

Two records, no data.

ICELAND

Nine records ranging from March 6 to July 2.



TEXT-FIGURE 1. Map showing occurrences of Barrow's Golden-eye in eastern North America.

Thus it will be seen that there are, all told, something over two thousand records ranging from Oct. 11 to April 20. This is exclusive of Greenland and Iceland which, combined, give a total of 31 records.

Locality	*No.*	*Date*	*Reference and authority*	*Remarks*
			GREENLAND	
No data	2	.....	Specimens, Am. Mus. Nat. Hist.	
			ICELAND	
North Iceland	1	July 2, 1909	Specimen, Chicago Nat. Hist. Mus.	
Myvattn	1	March 23	Specimen, Chicago Nat. Hist. Mus.	
Laxardal	1	May 23, 1935	Specimen, Chicago Nat. Hist. Mus.	
Laxardal	1	June, 1935	Specimen, Chicago Nat. Hist. Mus.	
Laxardal	1	March 10, 1936	Specimen, Chicago Nat. Hist. Mus.	
Laxardal	1	April 29, 1939	Specimen, "Peet" Coll., University Mich.	
Laxardal	1	May 16, 1939	Specimen, "Peet" Coll., University Mich.	
Lake Myrmalu	1	March 6, 1911	Specimen, Royal Ontario Mus. Zool., Toronto.	
Lake Myrmalu	1	March 8, 1911	Specimen, Royal Ontario Mus. Zool., Toronto.	
			QUEBEC	
Bonaventure Island	3	Nov. 10, 1939	Harrison F. Lewis.	Sight; by letter
Point de Monte	+	1881	Merriam. Bull. Nutt. Orn. Cl., 7: 240, 1882. Common resident, breeding.	Sight
Godbout River	+	1881	Merriam. Bull. Nutt. Orn. Cl., 7: 240, 1882. N. A. Comeau showed skins of both sexes taken here.	Specimens
Mont Louis, Gaspé Peninsula	+	April 20, 1924	John B. Demille, Auk, 43: 514, 1926.	Sight
Pilgrim Isls., Kamouraska Co.	2	Dec. 22, 1939	Specimens, Royal Ontario Mus. Zool., Toronto.	
La Baie des Rochers, Saguenay Province	1	Nov. 1942	Dr. Déry.	Specimen; by letter
Lower St. Lawrence	+	About October	J. Arthur Mathewson. Reports a flock of about 1500 seen some years ago by his father S. J. Mathewson and himself. Some are present every winter.	Sight; by letter
Montreal, Ladine	1	Spring 1939	S. J. Mathewson.	Sight; by letter
Bonne Esperance, Saguenay Province	1	Feb. 20, 1896	Specimen, Nat. Mus. Canada (A. L. Rand).	By letter
Percé	4	Feb. 1915	Specimen, Nat. Mus. Canada (A. L. Rand).	By letter
Rimouski	9	.....	Specimen, Nat. Mus. Canada (A. L. Rand).	By letter
Bonaventure Island	1	Feb. 16, 1916	Specimen, University Mus., Michigan.	
Piastre Bay	1	June 1909	Specimen, Mus. Comp. Zoöl.	
Metis	+	.....	Harrison F. Lewis. Occurs regularly on the St. Lawrence, vicinity of Metis.	Sight; by letter
St. Lawrence River	1	.....	Specimen, Acad. Nat. Sci. Phila.	By letter; very old specimen
Sorel	1	Fall 1942	S. J. Mathewson.	Specimen; by letter
.....	3	.....	S. J. Mathewson.	Specimen; by letter

QUEBEC—*cont.*

Locality	*No.*	*Date*	*Reference and authority*	*Remarks*
Bonaventure Island	1	Feb., 1918	W. Duvall, Specimen Nat. Mus. Canada.	By letter
Bonaventure Island	1	Feb. 20, 1918	W. Duvall, Specimen Nat. Mus. Canada.	By letter
Bonaventure Island	6	Feb., 1916	W. Duvall, Specimen Nat. Mus. Canada.	By letter
Bonaventure Island	2	Feb., 1916	Specimen, Chicago Nat. Hist. Mus.	
Lower St. Lawrence	1	May 15, 1917	Specimen, Carnegie Mus.	
Bay St. Claire Anticosti	+	Jan. 3, 1902	Joseph Schmitt, Monograph de l'Isle d'Anticosti: 295, 1904.	Sight
Missisquoi on Lake Champlain	1	.....	M. Chamberlain, Catalogue Canadian Birds: 24, 1887.	Specimen; nest and eggs taken
			NOVA SCOTIA	
Digby Basin, Digby Co.	+	1919	R. W. Tufts (Unpublished notes).	By letter; sight
Little River Harbor	1	Dec. 31, 1920	R. W. Tufts (Unpublished notes).	By letter; sight
Gaspereaux River	2	Jan. 2, 1933	R. W. Tufts (Unpublished notes).	By letter; sight
Gaspereaux River	1	Jan. 14, 1933	R. W. Tufts (Unpublished notes).	By letter; sight
Little Duck Island, Grand Manan Archipelago	1	Nov. 25, 1921	Proc. and Trans. Nova Scotia Inst. Sci., 19: 326, 1937–1938 (1939).	Specimen
"Nova Scotia"	+	Spring	Proc. and Trans. Nova Scotia Inst. Sci., 8: 149, 1888. Taken occasionally.	
Halifax, Steele's Pond, Point Pleasant	1	April 4, 1885	Donald K. Crowdes, Specimen, Provincial Mus. Nova Scotia.	Specimen; by letter
.....	1	.....	J. P. Gilpin, Proc. and Trans. Nova Scotia Inst. Sci., 1878. Specimen, Provincial Mus. Nova Scotia.	Specimen; by letter
			ONTARIO	
Hamilton	3	1886	McIlwraith, Birds of Ontario: 81; 1885.	Specimens
Prescott Co.	1	Oct. 9, 1900	Specimen, Mus. Comp. Zoöl.	
Fisherman's Is., Toronto	1	April 4, 1909	J. M. Spiers.	Sight; by letter
Fisherman's Is., Toronto	1	March 26, 1911	J. M. Spiers.	Sight; by letter
Toronto	1	April 18, 1885	Ernest E. T. Seton, Auk, 2: 336, 1885.	Specimens
Lucknow	+	Winter	Dr. Garner, Birds of Ontario: 81, 1885. Reports them occasionally along shore of Lake Huron.	
			PRINCE EDWARD ISLAND	
St. Peter's Bay	2	Spring, 1904	McSwain, Proc. and Trans. Nova Scotia Inst. Sci., 11: 573, 1908.	Specimens
			LABRADOR	
Davis Inlet	+	1886	Austin, Birds of Newfoundland Labrador: 45, 1932.	Specimens by Turner
Killinek	1	Aug. 30, 1906	Austin, Birds of Newfoundland Labrador: 45, 1932.	Specimen
Killinek	+	About 1900	Austin, Birds of Newfoundland Labrador: 45, 1932.	Sight

LABRADOR—*cont.*

Locality	*No.*	*Date*	*Reference and authority*	*Remarks*
Killinek	6	1906	Austin, Birds of Newfoundland Labrador: 45, 1932. Hantzsh and Turner say plentiful along coast.	Sight
Nakeak	1	Spring, 1883	Specimen U. S. Nat. Mus.	
"Labrador"	1	Jan., 1909	Specimen in Mus. Comp. Zoöl.	
Blanc Sablon	1	Nov. 3, 1930	Specimen in Mus. Univ. Michigan.	
Red Bay	1	Sept. 9, 1924	Specimen in Mus. Univ. Michigan.	
Hegashga River	1	Spring, 1895	Specimen in Am. Mus. Nat. Hist.	
"Labrador"	1	Feb. 10, 1881	Specimen in Am. Mus. Nat. Hist.	
Piashte Bai	2	Jan., 1908	Townsend and Bent, Auk, 27: 10, 1910, record it a regular winter visitant.	
Koksoak River	+	.....	Bent, U. S. Nat. Mus., Bull. 130; 30, 1925.	
Netashquan	+	.....	American Field, 34: 79, 1890. Prof. Winfrid A. Stearns.	
Esquimaux River	+	.....	American Field, 34: 79, 1890. Prof. Winfrid A. Stearns.	
Coast of Labrador	+	.....	Bent, U. S. Nat. Mus., Bull. 130: 30, 1925, states from Turner's unpublished notes that they are quite common along entire coast of Labrador, and that large numbers came into a certain cove for shelter during a storm.	
			NEW BRUNSWICK	
Oak Bay	1	Feb. 13, 1890	Specimen Chicago Nat. Hist. Mus.	
Near St. John on Kennebecessis River	2	May 11, 1941	Howard L. Mendell and John Pearce of Fish and Wild Life Service.	Sight: by letter
Miscon Is.	1	Dec. 15, 1915	A. L. Rand. Specimen, Nat. Mus. Canada.	By letter
Miscon Is.	1	Jan. 18, 1918	A. L. Rand. Specimen, Nat. Mus. Canada.	By letter
Mispeck	1	March 26, 1883	Specimen, Am. Mus. Nat. Hist.	
"New Brunswick"	+	.....	M. Chamberlain, Bull. Nat. Hist. Soc. New Brunswick, 1: 23–26, 1882. "Not uncommon."	
Oak Bay	1	.....	Specimen, U. S. Nat. Mus.	
St. John Co.	1	March 26, 1883	Specimen, Mus. Comp. Zoöl.	
Oak Bay	1	Dec., 1889	Specimen, Mus. Comp. Zoöl.	
St. John's River Valley	2	Spring, 1941	John Pearce.	Specimens; by letter
			MAINE	
Bar Harbor	1	April 10, 1885	Specimen, Am. Mus. Nat. Hist.	
Bar Harbor	1	April 10, 1888	Specimen, Am. Mus. Nat. Hist.	
Milford	1	May 10, 1882	Specimen, Am. Mus. Nat. Hist.	
Brunswick	2	Nov. 12, 1923	Alfred O. Gross.	Specimen; by letter
Blue Hill, Hancock Co.	1	April 12, 1939	Howard L. Mendell.	Sight; by letter
Penobscot River	2	Oct. 24, 1940	Howard L. Mendell.	Specimen; by letter
Buckport, Hancock Co.	1	.....	Specimen, Royal Ont. Mus. Zool., Toronto.	By letter
Bangor	1	March 13, 1884	Specimen Peabody Mus., New Haven, Conn.	
Scarboro	2	Dec. 30, 1911	Norton, Auk, 30: 575, 1913.	Specimen
Scarboro	2	Jan. 11, 1912	Norton, Auk, 30: 575, 1913.	Specimen
Scarboro	1	March 26, 1912	Norton, Auk, 30: 575, 1913.	Specimen

MAINE—*cont.*

Locality	*No.*	*Date*	*Reference and authority*	*Remarks*
Scarboro	1	March 28, 1912	Norton, Auk, 30: 575, 1913.	Specimen
Bar Harbor	2	41st Christmas Census	Aud. Mag., 43: 76, 1941.	Sight
Bar Harbor	25	39th Christmas Census	Bird Lore, 41: 4, 1939.	Sight
Calais	1	.....	Specimen, U. S. Nat. Mus.	
Milltown	2	March, 1883	Specimens, Mus. Comp. Zoöl.	
Buckport	1	April, 1896	Specimens, Mus. Comp. Zoöl.	
Buckport	3	Feb. 1, 1894	Specimens, Mus. Comp. Zoöl.	
Buckport	1	March 3, 1890	Specimen, Chicago Mus. Nat. Hist.	
Fort Point	1	Jan. 15, 1892	Specimen, Mus. Comp. Zoöl.	
Fort Point	1	March 7, 1892	Specimen, Mus. Comp. Zoöl.	
Isle-au-Haut	1	Jan. 10, 1883	Specimen, Mus. Comp. Zoöl.	
Penobscot Co.	1	Dec. 14, 1911	Specimen, Chicago Mus. Nat. Hist.	
Penobscot Co.	1	1895	Specimen, Chicago Mus. Nat. Hist.	
Bar Harbor	1	March, 1888	Specimen, Chicago Mus. Nat. Hist.	
Calais	1	About 1860	Specimen, Dartmouth College Mus.	
		NEW HAMPSHIRE		
Dover	1	.....	R. L. Weaver, copied from notes by Charles F. Goodhue, 'Fifty years among the Birds of New Hampshire.'	Specimen; by letter
Portsmouth, "Little Bay"	1	1909	G. M. Allen (through letter from R. L. Weaver).	Sight: by letter
Pittsburg	2	Jan., 1940	Ralph M. Carpenter.	Sight: by letter
		VERMONT		
Wells River	4	Winter of 1919–1920	W. P. Smith, Auk, 38: 467, 1921.	Sight
Wells River	1	Feb. 3–23, 1920	R. L. Weaver and W. P. Smith.	Sight; by letter
Lunenburg	1	.....	Specimen Fairbanks Mus. Nat. Hist., St. Johnsbury.	By letter, W. P. Smith
Lake Champlain	+	Fall, 1917	D. E. Kent and G. L. Kirk. Several seen in the hands of hunters.	Specimens; by letter
Newbury	+	Winter of 1918–1919	Aaron C. Bagg, Auk, 40: 265, 1923. Several seen at junction of Wells and Connecticut rivers.	Sight
Bridgeport	+	Nov. 17, 1917	R. L. Weaver on authority of Bagg and Elliot. A number of birds seen.	Sight; by letter
		MASSACHUSETTS		
Quincy	1	Jan. 27, 1940	Wendell Taber.	Sight; by letter
Greenwich	1	Feb. 28, 1910	Bagg and Elliot, Birds of the Connecticut Valley in Massachusetts: 90, 1937. Specimen, Mus. Bost. Soc. Nat. Hist.	
Agawan, "Cola Shasta"	1	April 3, 1923	In Notes of Alice M. Bowers by Elliot in 1935.	Specimen
Agawan, Conn. River	1	Nov. 5, 1935	Bagg and Elliot, Birds of the Connecticut Valley in Massachusetts: 91, 1937.	Sight
Beverly	6	Jan. 12, 1939	F. Gilbert Emilio.	Sight: by letter
Beverly	2	Jan. 8, 1939	F. Gilbert Emilio.	Sight: by letter
Beverly	1+	Dec. 26, 1938	F. Gilbert Emilio.	Sight; by letter
Cape Ann	2	Jan. 23, 1934	F. Gilbert Emilio.	Sight; by letter

MASSACHUSETTS—*cont.*

Locality	*No.*	*Date*	*Reference and authority*	*Remarks*
Lynn	195	Nov. 25, 1926–April 25, 1928	F. Gilbert Emilio. Positive individuals.	Sight; by letter
Lynn	14+	Nov. 25, 1926–April 25, 1928	F. Gilbert Emilio. Where they were uncountable.	Sight; by letter
Nahant	3	Christmas Census of Dec. 24, 1928	Crosby, Griscom, Emilio and Preston, Bird Lore, 30: 30, 1928.	Sight
Lynn	6			
Marblehead				
Nahant, Essex Co.	1	March, 1878	Townsend, Mem. Nutt. Orn. Club, 3: 139, 1905.	Specimen
Cape Cod	1	1872	Specimen, Mus. Comp. Zoöl.	
Boston Market	1	Feb. 11, 1880	Specimen, Mus. Comp. Zoöl.	
Boston Market	1	Feb. 18, 1881	Specimen, Mus. Comp. Zoöl.	
Newburyport	1	Dec. 3, 1942	Stanley C. Ball, New England Bird Life, 6: 12, 1942.	Specimen
Cape Cod	1	Dec. 7, 1871	Howe, Birds of Massachusetts: 55, 1901.	Specimen
Boston Market	2+	Winter of 1871–1872	Howe, Birds of Massachusetts: 55, 1901. Two males and a number of females.	Specimens
Cape Cod	1	39th Christmas Census	Bird Lore, 41: 40, 1939.	Sight
Cambridge	1	39th Christmas Census	Bird Lore, 41: 5, 1939.	Sight
Cambridge	2	35th Christmas Census	Bird Lore, 37: 35, 1935.	Sight
Essex Co.	1	30th Christmas Census	Bird Lore, 32: 23, 1930.	Sight
Lynn	3	Jan. 26, 1919	Townsend, Mem. Nutt. Orn. Club, 3: 39, 1905.	Sight
Newburyport Harbor	1	Mar. 24, 1925	Wendell Taber.	Sight; by letter
Newburyport Harbor	1	April 15, 1940	Wendell Taber.	Sight; by letter
Essex Co.	1	Jan. 19, 1941	Wendell Taber.	Sight; by letter
Rockport	1	Jan. 25, 1941	Wendell Taber.	Sight; by letter
Rockport	1	Feb. 22, 1942	Wendell Taber.	Sight; by letter
			RHODE ISLAND	
Sakonnet Point	3+	.....	Harold N. Gibbs.	3 specimens; others seen
Kingston	1	Dec. 26, 1940	Audubon Magazine, 43; 8, 1941.	Sight
Providence	1	Dec., 1941	Audubon Magazine, 43: 81, 1941.	Sight
Providence	1	Dec., 1880	Specimen Mus. Comp. Zoöl.	Sight
Narragansett	1	Feb. 6, 1940	Edward L. Coman.	Sight
Narragansett	1	Dec. 21, 1940	Coman and Kraus.	Sight
Narragansett	1	Feb. 22, 1941	Coman and Kraus.	Sight
Narragansett	1	Jan. 3, 1942	Coman and Kraus.	Sight
Narragansett	1	March 5, 1939	Harold N. Gibbs.	Sight
Narragansett	1	March 24, 1939	Harold N. Gibbs.	Sight
Narragansett	1	April 8, 1939	Kraus and Gibbs.	Sight
Bristol Harbor	3	Jan. 14, 1940	Harold N. Gibbs.	Sight; by letter
Narragansett	1	Dec. 19, 1940	Kraus and Gibbs.	Sight; by letter
Narragansett	1	Jan., 1941	Kraus and Gibbs.	Sight; by letter
			CONNECTICUT	
Meriden	4	1919–1920	Wendell P. Smith, Auk, 38: 467, 1921.	Sight
So. Windsor	2	Nov. 19, 1939	M. L. Hoffman, Auk, 57: 244, 1940.	Sight

CONNECTICUT—*cont.*

Locality	*No.*	*Date*	*Reference and authority*	*Remarks*
Long Island Sound	1	Nov. 14, 1867	Merriam, Birds of Connecticut: 126, 1877.	Specimen
East Haven	2	Dec. 25, 1883	Sage, Bishop and Bliss, Birds of Connecticut; 36, 1913.	Specimens
Westport	2	Mar. 21, 1937	Aretas A. Saunders.	Sight; by letter
Long Island Sound	1	Nov. 14, 1867	Sage, Bishop and Bliss, Birds of Connecticut: 36, 1913. Specimen, Peabody Mus.	
Noank	+	.....	Ralph E. Danforth (Finds a few).	Letter

NEW YORK

Ogdenburg	40	Prior to 1898	D. G. Elliot, Wildfowl of North America: 181, 1898, Says he found it at times quite common on the St. Lawrence River. (Eaton says about 40 taken.)	Specimens
Orient, L. I.	9	Jan. 5, 1909	Roy Latham.	Sight; by letter
Orient, L. I.	1	Feb. 11, 1926	Roy Latham.	Sight; by letter
Orient, L. I.	1	Feb. 16, 1918	Roy Latham.	Sight; by letter
Orient, L. I.	3	March 3, 1918	Roy Latham.	Sight; by letter
Brockport	1	March 28, 1888	Specimen, Am. Mus. Nat. Hist.	
Long Island	1	.....	Dutcher, Auk, 10: 270, 1893.	Specimen
Green Island	1	Jan. 21, 1887	Eaton, Birds of New York: 211, 1910.	Specimen
Sodus Bay	1	Nov. 1904	Eaton, Birds of New York: 211, 1910.	Specimen
Long Island	1	Nov. 1904	Eaton, Birds of New York: 211, 1910.	Specimen
St. Lawrence River	1	About 1898	Specimen, U. S. Nat. Mus.	
Niagara River	1	Feb. 22, 1899	Specimen, Mus. Comp. Zoöl.	
Burkport	1	Nov. 23, 1911	Harold D. Mitchell.	Specimen; by letter
Long Island	1	.....	LeRoy Wilcox, Specimen Long Island Historical Soc.	
Montauk, L. I.	8	Feb. 1, 1937 to Jan. 23, 1939	Pangburn and Helmuth, (Cruickshank, Birds around New York City: 111, 1942).	Sight
Raritan Bay	1	Jan. 5, 1915	Cruickshank, Birds around New York City: 111, 1942.	Sight (Urner)
Raritan Bay	1	Feb. 5, 1939	Cruickshank, Birds around New York City: 111, 1942.	Sight (Brown, Edwards and Wolforth)
Smithtown, Long Island	1	March 18–25, 1940	J. J. Elliott.	Sight; by letter
Long Pond, Monroe Co.	1	March 11, 1934	Wm. L. G. Edson.	Sight; by letter

NEW JERSEY

Sandy Hook Bay	1	Feb. 5, 1939	Wolforth, Auk, 56: 329, 1939.	Sight
Cape May	1	35th Christmas Census	Bird Lore, 37: 45, 1935.	Sight

PENNSYLVANIA

Conneaut Lake	1	Nov., 1924	Annals Carnegie Mus., 18: 76, 1928.	Specimen

Locality	*No.*	*Date*	*Reference and authority*	*Remarks*
			MARYLAND	
Bush Point, mouth of Bush River	1	About Dec. 20, 1922	James Bond (Shot by A. J. Dando).	Specimen; by letter
			DISTRICT OF COLUMBIA	
Washington	1	Nov. 22, 1889	C. Herbert, Auk, 8: 112, 1891.	Specimen
			NORTH CAROLINA	
New Berne	1	1892	C. S. Brimley, Auk, 10: 241, 1893.	Specimen
Buncomb Co.	1	Feb. 1893	C. S. Brimley, Auk, 10: 241, 1893.	Specimen
"North Carolina"	1	Feb. 7, 1895	Specimen, Chicago Nat. Hist. Mus.	
			OHIO	
Lorain Co.	1	.....	Lynds Jones, Birds of Ohio: 44, 1903.	Specimen
"Southern Ohio"	1	March 1, 1925	Conrad Roth, Bird Lore, 29: 8, 1927.	Specimen
Sandusky Bay	1	.....	E. L. Mosely, Birds of Ohio, 609, 1903.	Sight
Bay Village	1	May 7–9, 1940	Bird Calender Cleveland Bird Club, 36th year, 4: 2, 1940.	Sight
Cleveland	3	March 21, 1941	Bird Calender Cleveland Bird Club, 37th year, 2: 4, 1940.	Sight
Lorain	1	March 30, 1892	L. M. McCormick, Auk, 9: 397, 1892.	Specimen
Lorain	1	April 5, 1892	Wilson Bull: 117, 1909. Specimen, Oberlin College Mus.	
			INDIANA	
Lower Wabash River, Gibson Co.	1	1874	Butler, Birds of Indiana: 622, 1898.	Specimen
Camden, Carroll Co.	1	March 10, 1885	Butler, Birds of Indiana: 622, 1898.	Specimen
Chicago	2	Dec. 14, 1896	Butler, Birds of Indiana: 622, 1898.	Specimens
			ILLINOIS	
Mt. Carmel	1	Dec., 1874	E. W. Nelson, Bull. Nat. Orn. Cl., 2: 41, 1876.	Specimen
Fox Lake	1	Jan. 2, 1889	Butler, Birds of Indiana: 622, 1898.	Specimen
			MICHIGAN	
Marquette	1	Oct. 23, 1942	S. Morris Pell (Seen in a gunner's bag).	Specimen; by letter
Hillsdale	1+	1892	A. J. Cook, Bull. Michigan State Agr. College, 94: 27, 1893 (Taken from a flock on a lake).	Specimen
Ottowa Co.	1	March 22, 1907	Barrows, Michigan Bird Life: 99, 1912.	Specimen
Edgerton	1	1877	Barrows, Michigan Bird Life: 99, 1912.	Specimen
Detroit	2	Dec., 1936	Bird Lore, 38: 71, 1936. 36th Christmas Census.	Sight
Detroit	4	Dec., 1926	Bird Lore, 28: 38, 1926. 26th Christmas Census.	Sight
Wayne Co.	1	About April 1, 1905	Occ. Papers Mus. Zool., University Michigan, 379: 7, 1938 (Van Tyne).	Specimen
Black Lake	1	March 22, 1907	Occ. Papers Mus. Zool., University Michigan, 379: 7, 1938 (Van Tyne).	Specimen
			WISCONSIN	
Green Bay	1	Dec., 1939	Bird Lore, 41: 40, 1930. 39th Christmas Census.	Sight
Beloit	1	April 4, 1899	Specimen Am. Mus. Nat. Hist.	

WISCONSIN—*cont.*

Locality	*No.*	*Date*	*Reference and authority*	*Remarks*
Milwaukee Harbor	2	Feb. 9, 1922	O. J. Gromme. Two swam in; shot the male but lost him, secured the other. (Taken from field notes.)	Specimens; by letter
Lake Koshkonong	1	Nov. 14, 1896	Barrows, Michigan Bird Life: 99, 1912.	
			MINNESOTA	
Big Woods	1	1877	Roberts, Notes on Birds of Minnesota, in Geol. and Nat. Hist. Survey Minnesota: 65, 1892 (Hatch).	Specimen
Big Woods	1	1881	Roberts, Notes on Birds of Minnesota, in Geol. and Nat. Hist. Survey Minnesota: 65, 1892 (Hatch).	Specimen
Near Iowa state line	1	1891	Roberts, Notes on Birds of Minnesota, in Geol. and Nat. Hist. Survey Minnesota: 65, 1892 (Hatch).	Specimen
.....	1	.....	Roberts, Notes on Birds of Minnesota, in Geol. and Nat. Hist. Survey Minnesota: 65, 1892 (Hatch). (Dr. Hvoslef has a female.)	Specimen
Lake-of-the-woods	+	April, 1912	Roberts, Birds of Minnesota: 269, 1932. (T. Surber notes several flocks.)	Sight
Le Clair Point	1	April 10, 1912	Birds of Minnesota: 269, 1932. (Reported by Dr. Roberts.)	Specimen
Grand Marais	+	Nov. 30, 1928	Birds of Minnesota: 269, 1932. (Reported by Dr. W. P. Abbott.)	Sight
			IOWA	
Independence	1	Oct. 11, 1892	R. W. Anderson, Proc. Davenport Acad. Sci. 11: 177, 1907.	Specimen
Pottawattamie	...	.....	R. W. Anderson, Proc. Davenport Acad. Sci. 11: 177, 1907.	Sight
Linn	...	.....	R. W. Anderson, Proc. Davenport Acad. Sci. 11: 177, 1907.	Sight
Keokuk	...	.....	R. W. Anderson, Proc. Davenport Acad. Sci. 11: 177, 1907.	Sight

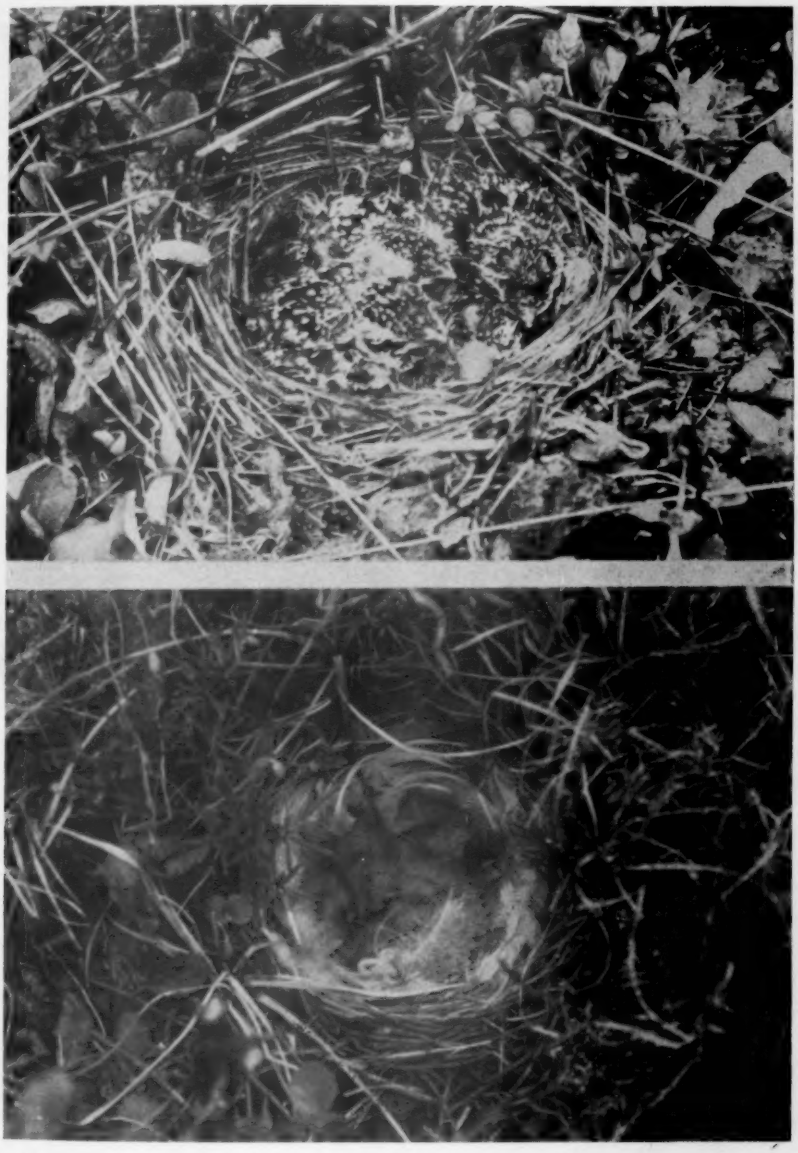
U. S. National Museum
Washington, D. C.

NOTES ON BREEDING LAPLAND LONGSPURS AT CHURCHILL, MANITOBA

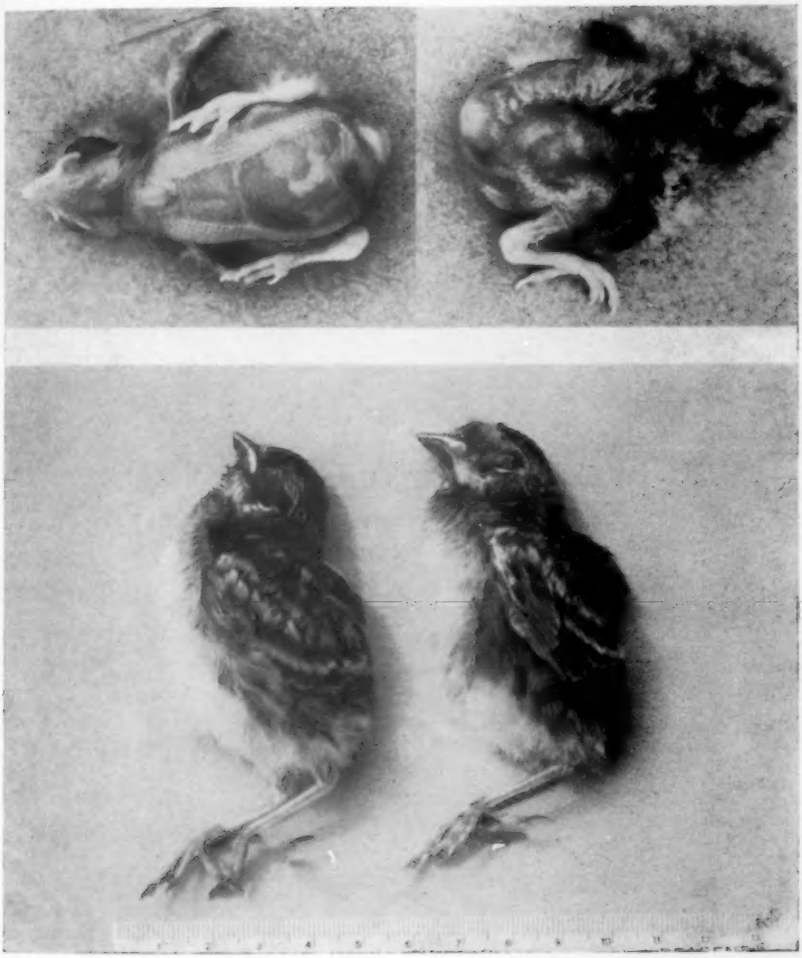
BY LAWRENCE I. GRINNELL

Plates 23–25

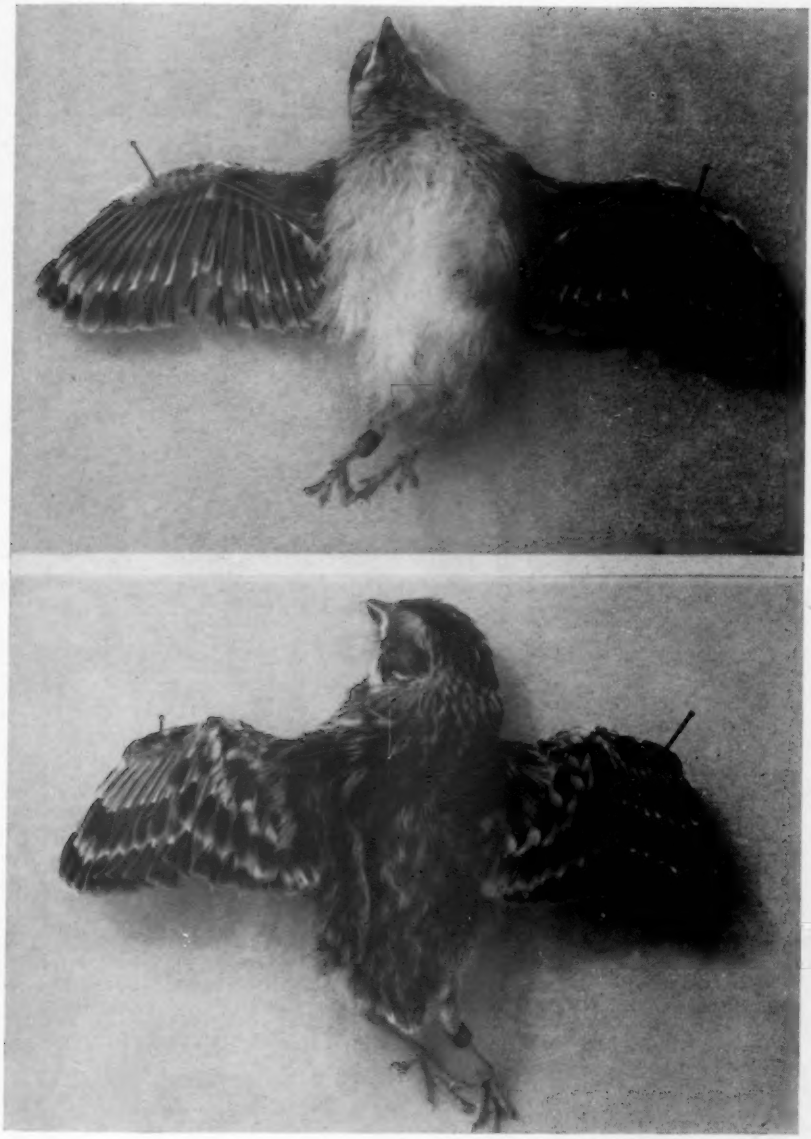
DURING a stay at Churchill, Manitoba, from June 2 to July 23, 1940, for the purpose of studying and photographing birds, the writer had opportunity to observe the reproductive habits of Lapland Longspurs (*Calcarius lapponicus lapponicus*). He is greatly indebted to Dr. Ralph S. Palmer for his assistance and advice during this study, and for the photographs reproduced herewith, and to Henry Dietrich of Cornell University, Carl Heinrich of the U. S. Department of Agriculture, and Dr. Walter C. Muenscher of Cornell University for their



LAPLAND LONGSPUR.—(*Upper figure*) YOUNG ABOUT READY TO LEAVE THE NEST. (*Lower figure*) YOUNG IN EARLY STAGE OF DEVELOPMENT.



LAPLAND LONGSPUR.—(*Upper figures*) NESTLINGS; EARLY STAGE. (*Lower figure*) ABOUT TEN DAYS OLD.



LAPLAND LONGSPUR.—YOUNG ABOUT TEN DAYS OLD.

identifications of material found in the stomachs of the birds that were collected.

PRE-NESTING ACTIVITIES

For about a month after my arrival at Churchill on June 2 I saw several Lapland Longspurs almost every day. In company with Northern Horned Larks (*Otocoris a. alpestris*) they fed on millet placed on a stone in front of two cabins three miles southeast of Churchill where my companion, Dr. Ralph S. Palmer, and I stayed. They continued to feed on the millet for about two weeks, until the nesting season got under way and they became shy.

VOICE

The song of the Lapland Longspur starts squeakily, like that of the Horned Lark, but differs in having an attractive, upturned, conversational ending, sounding like *sissawoo-weer,* or *seree-ar;* the entire call suggests the phrase, "the winter in Churchill is very severe." The song of the less common Smith's Longspur (*C. pictus*) is entirely different, sweeter in quality, and ending as if with an Italian-sounding name, *De Vespisi* (phonetically, *day-vespeezee*). The Lapland Longspur usually uttered its song from a conspicuous tundra hammock, or from the top of Churchill's water-pipe line, whereas the Smith's Longspur more often sang at the top of a dwarf spruce. On one occasion two male Smith's Longspurs were singing from perches within twenty feet of each other. The Smith's Longspurs also were in the habit of flitting around to a greater number of singing positions than the Lapland Longspur. The Horned Lark type of song of the latter was often given during a flight in which the bird ascended steeply, sometimes up about forty feet, then sailed gradually, with few wing-beats, to the ground some distance away, all the while uttering its song.

While hopping around near the nest, the male was heard to utter a call resembling *cheerio;* the female, a low *chirrup.* On my approaching the nest of one wary female, the bird would flush, promenade nervously, simulate picking imaginary materials off the ground, and emit a hoarse alarm note, *hee* (not uttered by others observed); also another metallic note, *kittyoo,* or *kee-you.*

NESTS

Nests were discovered between June 17 and 30. *C. lapponicus* appeared to be nesting somewhat earlier than its associate, *C. pictus.* I found no Smith's Longspur nest, but on June 20 I heard the song of a Lapland Longspur only once during the day, whereas the Smith's Longspurs were singing almost incessantly. As late as July 14, the

excited calls of two parent birds of the latter species attracted my attention to a fledgling walking on the ground.

All five nests were found within a radius of about one mile of camp. The shortest distance between any two nests was about 200 yards. During the period of active nesting, the tundra environment was soggy and full of little pools of water, but later became much drier.

All nests were situated in depressions on the ground. Three of these depressions were in small tufts of grass. Concealment of the nest not placed in a tuft was poorest; two of the tuft nests had a fair degree of concealment; the fourth nest was well concealed because of being partly covered by woody twigs.

Measurements of four nests showed, for interior nest diameter at top, a range of 6 to 7 cm., or an average of 6.75 cm.; for interior depth, a range of 3 to 6 cm., or an average of 4.50 cm. Nesting materials were grasses and ptarmigan feathers. Number of eggs per clutch was four to five [H. M. S. Blair (Birds of East Finmark, Ibis, ser. 13, 6: 301–302, 1936) reports the finding of sets of seven on three occasions in East Finmark]. Incubation dates for one nest extended from June 17, or earlier, to June 27 to 30, making a total incubation period of over 10 days; for a second nest, before June 20 to June 28 and 29. Hatching dates varied from around June 25 to 30. In four nests the number of chicks per brood ranged from two (where an infertile egg also was found) to four (in the case of three nests). The nestling period for one brood watched was between 10 and 11 days. The fate of the nestlings in one nest was uncertain but, based on three other nests, out of 12 eggs or nestlings first discovered, six individuals, or 50 per cent, were able to leave the nest.

BEHAVIOR

The distance at which nesting birds would flush on approach varied considerably. One female with four young, four days old, allowed approach to within two feet before flushing; another shier individual would flush at fifty yards distance and fly toward the intruder, uttering the *hee* note. After the observer entered a blind, the birds usually returned within five minutes, sometimes immediately. On leaving the nest, whether surprised or not, they usually flew off fifty to one hundred feet, then fed on the ground. Returning, they either flew directly back, or sneaked back on foot in furrows, occasionally stretching up the neck to reconnoitre. The male walked fast, with a slight hop now and then, holding his back horizontal and his head forward, low and facing directly ahead, suggestive of a locomotive headlight in miniature.

During incubation and brooding, female Lapland Longspurs usually ignored small noises made in the blind, such as the humming of a moving-picture camera, and also the longer songs of near-by associates, such as the Smith's Longspur, Savannah, White-crowned and Tree Sparrows, Robin, and Horned Lark, or the aërial whinnying of a Wilson's Snipe. But they were promptly alert to short call notes, such as the Redpoll's *chit-chit-chit* when flying, or its *tu-wee* when perching, the Semipalmated Plover's *keerweet,* and the calls of the Hudsonian Curlew and Stilt Sandpiper.

Incubation and Brooding

During a total period of 11 hours, 53 minutes of observation during seven different days between June 21 and July 3, incubating and brooding females were recorded off the nest 302 minutes, or 42 per cent; on the nest, 411 minutes, or 58 per cent. On a relatively warm July day, there were only five feedings of five to six-day nestlings in 77 minutes, or only once every 15.4 minutes. Instead, the parent spent much time with wings spread over the young. On the following cooler day, however, the parent was kept busily engaged in procuring food for its hungry offspring. Thus, on this day, an average of only seven full minutes out of a total of 83, or only eight per cent, were occupied on the nest, although the bird visited it twenty times, or once almost every four minutes.

Eggs

Egg weights (in grams) of five eggs from the same nest measured on June 29 were as follows: 2.2, 2.3, 2.4 (2), 2.6; average 2.38 gm. On June 29, egg shells of nestlings just hatched were absent, suggesting that they were removed from the nest.

Development of Nestlings

The following brief notes cover observations on the daily development of nine different Lapland Longspur nestlings. The notes are integrated from different sources. Remarks for Day 1 were based on six individuals; for Days 2 to 8, mainly one individual; Days 9 and 10, two different individuals.

Feather Tracts

Day 1. Down present on dorsal tract (none on back of neck), wing, sides of capital tract; none on ventral or caudal tracts. Down grayish white, with darker, smoky-looking tips. Longest down 10 mm.

Day 2. Same as Day 1, except down of capital tract definitely in three parts: over each eye and on back of head; crural tract, row of down about 6 mm.

long; tibial tract, small tuft of down present at lower extremity. Down buff, marked partly with grayish black.

Day 3. Darkened juvenal feathers first visible in various tracts.

Day 4. Juvenal feathers of dorsal tract, also primaries and secondaries of wing have come through skin.

Day 5. Juvenal feathers of ventral tract just breaking through skin.

Day 6. Juvenal feathers of ventral tract out 2 mm.

Day 9. Dorsal tract; feathers 12 mm. long (7 mm. out of sheath; ventral tract: feathers about 9 mm. (almost out of sheath for whole length); down still present except on ventral tract, where probably removed by wriggling in nest.

Day 10. (Date of leaving nest.) Dorsal tract: plumage has become quite brownish; feathers on middle point of dorsal tract roughly 14 mm. long (10–12 mm. out of sheath); a little down still present; ventral tract buffy, feathers about 12–14 mm. long (9 mm. out of sheath). A little down still present on innermost secondaries.

Skin

Day 1. In general, pinkish orange.

Days 2–5. Noticeably darker each day. On Day 2, much of the pinkish color was lost.

Inside of Throat

Red-brown on Days 2 and 3.

Day 3. Some yellowish color appearing. Beginning to get blue on tip.

Egg tooth noticeable on Day 1; still present on Day 5.

Eyes

Closed on Day 1; partly open, Days 2–5; fully open, Day 6.

Length of Hind Claw

Day 4, 2 mm.; Day 6, 3+ mm.; Day 10, 6 mm.

Feces

Day 9. Becoming darker; weight, nearly 6 gms.

Activities

Day 4. For first time able to sit up on tarsi, after having been turned over on back. Uttered a clicking sound with every breath. They were also heard to squeak when fed.

Days 5–6. On approach of parent to nest, heads and open mouths of five nestlings shot up. They uttered an indistinct, high-pitched *ch-ch*.

Day 7. Vigorous; struggled when handled; tried to get out of box.

Day 9. Showed signs of fear; backed up when handled.

Day 10. Mosquitoes thick; nestlings hopping up and down and vainly shaking heads to shake off mosquitoes, which alighted on corners of gape and around eyes. Apteria on back between dorsal and alar tracts appeared inflamed, perhaps from mosquito bites.

DAILY GROWTH OF NESTLINGS

A table shows the daily growth of the nestlings. Five different individuals were measured at various times, although not always all five on each day. Daily increase of weight shows no characteristic

AVERAGE DAILY GROWTH OF LAPLAND LONGSPUR NESTLINGS

	Length (mm.)								*Wt. (gm.)*	
	Total Length		*Wing*	*Tail*		*Sheathed primary (av.)*		*Tarsus to middle toe*	*Av.*	*Av. incr.*
Day	*Av.*	*Av. incr.*	*(av.)*	*Tot.*	*L. out of sheath*	*Tot.*	*L. out of sheath*			
1	37	—	7+	—	—	—	—	11	2.6	—
2	44	7	9½	—	—	—	—	13	4.0	1.4
3	50	6	10.7	—	—	1+	—	20	5.9	1.9
4	55+	5	11	—	—	—	—	22.5	7.9	2.0
5	67	12	15	—	—	2	—	28.5	9.9	2.0
6	70.5	2.5	19.7	—	—	3+	—	32.5	13.2	3.3
7	78.5	8	24.0	—	—	8	—	35	16.0	2.8
8	87	—	31.0	5	1	17	1	38	19.8	—
9	86.5	—	38.5	8	6	21.5	6	40.5	19.7	—

tendency but is irregular, whereas average weight increased progressively up to Day 6. Weight analyses for the last two days are misleading because a different brood was weighed; the brood previously measured had prematurely disappeared.

Measurements of testes and weights of three adult Lapland Longspurs and two Smith's Longspurs collected were as follows:

		Dia. of Testes				
		Length		*Width*		*Weight*
	Date Collected	*L.*	*R.*	*L.*	*R.*	*of bird*
Lapland Longspur:	June 22, 1940	8 mm.	9	6	7.5	27.7 gm.
	June 22, 1940	11.5	9	8	8	30.2
	June 28, 1940	11	10	7	8	27.9
	July 19, 1940	Unrecognizable		(injured)		30.0
	Average	9.7		7.4		28.95
Smith's Longspurs:	June 28, 1940	13.5	11	10	9	29.5
	July 19, 1940	—	—	—	—	26.4
	July 19, 1940	5	4	3.5	3.5	28.7
	Average	9.25	7.5	6.75	6.25	28.2

Stomach analyses of nine Lapland Longspurs and three Smith's Longspurs collected between June 22 and July 19 gave the following results:

Lapland Longspur.—

Animal matter:	INSECTA	DIPTERA	TIPULIDAE	
		LEPIDOPTERA	PIERIDAE	
		COLEOPTERA	CURCULIONIDAE	
		COLEOPTERA	— — —	(beetle wing)
	GASTROPODA	— — —	— — —	small snail
Vegetable matter:	(Moss capsules and leaf remains)			
	(Seeds of *Carex* and *Draba*)			
	(Unidentifiable seeds)			
Mineral matter:	(Traces of gravel)			

Smith's Longspur.—

Animal matter:	INSECTA	HETEROPTERA	SALDIDAE	
		COLEOPTERA	CARABIDAE	
		COLEOPTERA	STAPHYLINIDAE	
		COLEOPTERA	CHRYSOMELIDAE	
		COLEOPTERA	CANTHARIDAE	(*Podabrus*)
		HYMENOPTERA	TENTHREDINIDAE	
	ARACHNOIDEA	ARANEIDA	LYCOSIDAE	
		ACARINA	— — —	(Mites)
Vegetable matter:	(Moss capsules and leaf remains)			
Mineral matter:	(Traces of gravel)			

Ithaca
New York

THE EFFECT OF TREE REMOVAL ON A MOURNING DOVE POPULATION

BY H. ELLIOTT MCCLURE

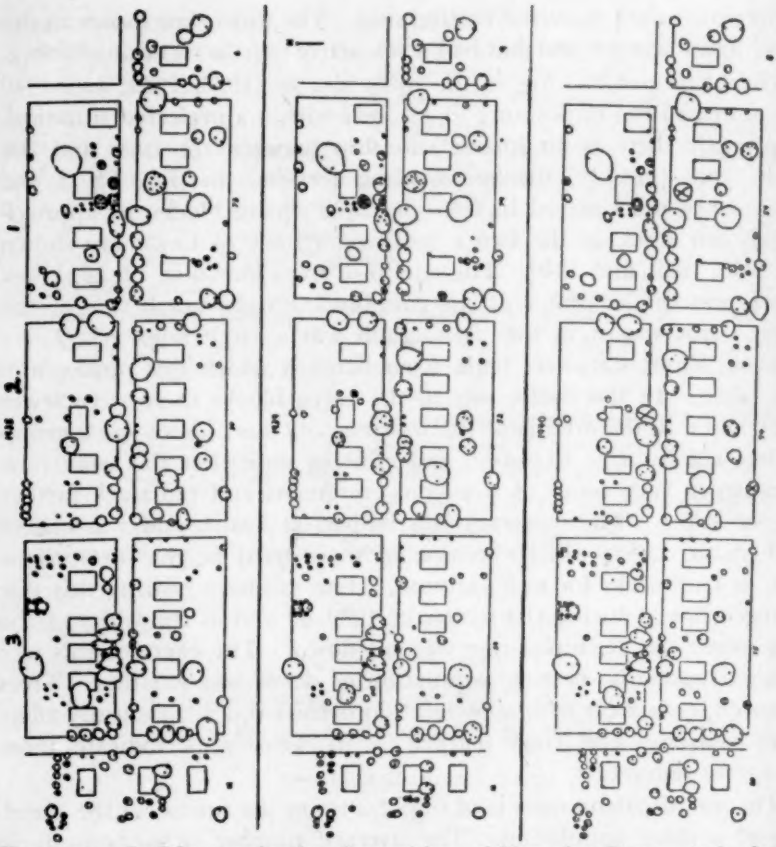
Plate 26

DURING the course of observations on the Mourning Dove in southwestern Iowa, it became evident that certain individual trees or groups of trees within the town of Lewis and nearby farmyards were preferred as nesting sites by the birds. These trees were so consistently used year after year that the term "patron trees" is suggested for them. Although the Mourning Dove is not necessarily gregarious in its nesting habits, some trees are so desirable as nesting sites that many pairs will use them. The birds' territorial demands are elastic enough that they submit to crowding to the point that sometimes there are as many as seven active nests in a tree. The upper figure in the accompanying photographs (Plate 26) shows a group of red pine, *Pinus resinosa,* near Lewis and the lower figure shows a group of one Norway spruce, *Picea abies,* two blue spruce, *Picea pungens,* four apples, *Pyrus malus,* one large American elm, *Ulmus americana,* and several other trees on a private property within

Lewis which were preferred nesting sites. The third pine shown in the upper figure was the one that had seven active nests as mentioned above.

The history of nesting at the town site for 1938, 1939, and 1940 demonstrated the importance of all trees within a preferred situation. Apparently there is an interrelationship between the trees and the birds, and, possibly, the surrounding terrain. In Text-fig. 1 the positions of nests placed in trees on three square blocks, or approximately ten acres, in the better nesting territory of Lewis are shown for 1938, 1939, and 1940. The clump of trees shown in Pl. 26, lower figure, was in the center of the east block on the north side of the street. Not shown in the photograph was a large tamarack, *Larix laricina,* about sixty feet high, from beneath which this photograph was taken. In the center one of the three blocks there were fewer trees, while in the middle of the westernmost block there was a group of box elders, *Acer negundo,* and elms in somewhat the same relationship to each other as were the evergreens and tamarack farther up the street. The tamarack was in perfect health and was one of two within Lewis which, because of their great height, were to be seen as landmarks for miles around. The property bearing this tree changed hands during the winter of 1939–40 and at the whim of the new owner the beautiful tree was cut down. The effect of this tree removal upon the nesting population of doves was startling. Trees removed from areas of low population density did not radically affect dove nesting. The trees marked X in Text-fig. 1 indicate those that were removed.

The use of patron trees is of importance to the success in the breeding of a dove population. The average number of nests built in patron trees in town was 2.6 in 1938 and 1939, and 2.1 in 1940. Because of greater localization of nesting activity in the country, the number of nests per patron tree was 3.4 in 1938, 3.5 in 1939, and but 2.1 in 1940. In 1938, the largest number of nests to be built in one tree in town was in the Norway spruce above mentioned. It then supported ten. In 1939, it was again the most important patron tree, containing twelve nests. The large tamarack bore nine nests in 1938 and eleven in 1939; these were used fifteen and fourteen times respectively. The nests built in the Norway spruce were used thirteen times in 1938 and twenty-one times in 1939. In 1940, use of this tree was reduced to seven nests and seven nestings. In the country in 1938, the largest numbers of nests were built in red pines. One, across the road from the group shown in Pl. 26, upper figure, supported fourteen nests which were used twenty-one times. In 1939, red pines continued



TEXT-FIGURE 1.—Diagram showing the positions of Mourning Dove nests in three blocks at Lewis, Iowa, in 1938, 1939, and 1940. Dots indicate nests and figures beneath each block show the number of nests in that block.

to be the most heavily used trees; one supported thirteen nests which were used seventeen times. Mourning Dove nesting throughout the study area showed a reduction in 1940, but red pines were still important, and one supported seven nests that were used ten times. Sixty per cent of the conifers that were used as nesting sites in town were patron trees, whereas forty-one per cent of the deciduous trees used by doves were patron trees. In the country, patron conifers ranked so high that among the trees of fourteen farmyards, a cemetery and a sixty-acre park, as well as several wooded gullies, thirteen trees bore twenty per cent of the nests in 1938, and sixteen trees bore twenty-five per cent in 1939. From this it would seem apparent that removal of a patron tree could be expected to produce an effect upon the birds.

(*Upper figure*) GROUP OF RED PINES NEAR LEWIS, IOWA. FAVORITE PATRON TREES FOR MOURNING DOVES. (*Lower figure*) FAVORITE NESTING SITE FOR DOVES IN LEWIS, IOWA. THE TREES IN THIS YARD SUPPORTED 35 NESTS IN 1939.

Beneath the drawing of each block for each year in Text-figure 1 is a numeral indicating the number of nests built that year. In 1938 block 1 contained seventy-three nests, while blocks 2 and 3 had respectively thirty and thirty-one nests. Nesting throughout Lewis increased in 1939, but in block 1 the increase was not great, raising the total to seventy-nine; while in block 2 the number was fifty-two, and in block 3, fifty-four. Either as the result of the removal of the tamarack in 1940, or because the removal of the tree had a contributory action, the total number dropped to fifty-nine. In block 2 there was little or no change (total, fifty-four nests), while in block 3 there was a considerable increase in the nesting population. Here the nests increased to seventy-five. In other words, apparently sixteen pairs left block 1 and sought out the trees of block 3. An examination of Text-figure 1 will show the positions of the nests, and it can be seen how the group of box elders and elms in block 3 came into use in 1940. The number of nests built in the partial blocks to the east and west shows an interesting correspondence with the rest of the population movement. The number of nests in the partial block to the east was six in 1938, increased to nine in 1939, and was eight in 1940. Evidently the birds did not move in this direction. The number of nests in the partial block to the west was twelve in 1938, twelve in 1939, and twenty in 1940, indicating an overflow from the increase in block 3.

There was another interesting result of the loss of this tree, although it may be merely a coincidence. In 1938, none of the doves built nests in eaves troughs in the three blocks. In 1939, two nests were built in eaves troughs in block 1 and one in the partial block to the west. When the birds returned in the spring of 1940 and sought their favorite trees, the tamarack was gone, and they seemed to seek to nest near where it had been, for in the neighboring three houses seven nests were built in eaves troughs, while within blocks 2 and 3, four more nests were found in eaves troughs.

It is believed from this three-year observation that nesting populations of doves are subject to considerable change as a result of change within or among the nesting sites. That this change need not be great is shown, for had there not been a close association in the minds of the birds between the various trees in block 1 they might simply have nested in trees other than the tamarack. Evidence would indicate that they moved westward as a group and nested in another favorable situation.

Ord
Nebraska

SEX RATIOS IN DUCKS

BY GEORGE A. PETRIDES

SINCE Lincoln (1932) published his rather startling figures on sex ratios in ducks, a small number of additional studies have been reported whose results, with original observations, have caused the author to wonder whether some of the methods of sex counts used yield data representative of true conditions and whether the entire subject should not be thrown open to more vigorous and widespread research than has lately been evident. It further seems probable that the full extent and complexity of the problem is not generally recognized. The present paper is an attempt, first, to summarize our knowledge of American waterfowl sex ratios, supplying some original field data, and, second, to analyze the effectiveness of our present procedures with special reference to sampling of the nation's duck population.

The author wishes to thank Mr. F. C. Lincoln and Miss May Thacher Cooke of the U. S. Fish and Wildlife Service for critically reading the manuscript and for compiling banding-return records, respectively.

Up to the present time, sex ratios of ducks have been determined from three principal sources—banding records, hunter's bag reports, and sight observations.

BANDING RECORDS

Lincoln's analysis of 40,904 banded ducks of ten species (*op. cit.*) still provides the most comprehensive data available regarding sex ratios in ducks. From records kept by banding-trap operators in many states, he determined the following:

Species	*Males*	*Females*	*Ratios (males : females)*
Mallard	12,386	9,572	56 : 44 (= 1.27 : 1)
Black Duck	477	344	58 : 42 (= 1.38 : 1)
Baldpate	413	251	62 : 38 (= 1.64 : 1)
Green-winged Teal	357	95	79 : 21 (= 3.75 : 1)
Blue-winged Teal	765	411	65 : 35 (= 1.86 : 1)
Pintail	6,308	3,759	63 : 37 (= 1.68 : 1)
Wood Duck	391	367	52 : 48 (= 1.07 : 1)
Canvas-back	226	127	64 : 36 (= 1.78 : 1)
Lesser Scaup Duck	2,633	1,444	65 : 35 (= 1.82 : 1)
Ring-necked Duck	455	123	79 : 21 (= 3.69 : 1)

Though the total numbers of ducks studied are small for some species, those for several other kinds run into five figures, nevertheless indicating unbalanced ratios. In view of the preponderance of males

trapped, the question arises as to whether banding traps are selective by sex. Lincoln (personal conversation) has often observed female birds leading flocks into traps, but the composition of these flocks is unknown. Conceivably, they might include a large proportion of males.

Hawkins (1940), in Illinois, found the sex ratio of 8,000 hunter-killed Mallards to be 57 : 43 (1.33 males : 1 female) while, during the same period, 3,700 Mallards were caught in banding traps in the ratio of 74 : 26 (2.84 : 1). In view of the greater proportion of males taken in traps, it would seem more likely that the traps, rather than hunters, were selective by sex, and, as will be shown in the next section, no hunter selection is apparent statistically for Mallards. Hawkins's study is a strong argument in favor of the use of hunters' bag reports, rather than banding records, in sex ratio investigations of ducks.

At the Roaches Run Sanctuary in Washington, D. C., during the winters of 1935–1939, Paul Hodge,[1] then caretaker, banded 69 male and 40 female Pintails, a ratio of 1.72 : 1, which contrasts rather sharply with the ratio of 1.26 : 1 prevalent in more than 12,000 Pintails counted there by the author during the winters of 1941–1943 (see beyond). Furthermore, though it supplies figures too small to be certainly significant, the author also captured eight male and five female Pintails (1.60 : 1) in a banding trap at Roaches Run during March, 1943, when the total population on the refuge occurred at a ratio of 1.26 : 1. Further experiments in this direction were cancelled due to military service.

If one can draw a parallel with the Ring-necked Pheasant, Leopold *et al.* (1943) state that in Wisconsin "census drives consistently show a higher percentage of cocks than the catch of the traps . . . We have no explanation as to why traps yield fewer cocks than the censuses, except that they are harder to trap. . . . We believe that the census tally . . . is more nearly correct than the trap tally." In ducks, females may be similarly just "harder to trap."

While, unfortunately, too few sex-ratio studies of ducks have been recorded in which more than one method of counting was used, to draw definite conclusions, what evidence we have points to the distinct possibility that banding traps may be less attractive to female than male ducks.

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[1] Other records kept by Mr. Hodge during this period provide limited banding-trap data for the Washington, D. C., region. The Black Ducks were sexed by bill markings:

Species	*Males*	*Females*	*Ratio*
Mallard	32	19	1.68 : 1
Black Duck	155	69	2.24 : 1
Lesser Scaup Duck	57	24	2.37 : 1
Canvas-back	42	11	3.81 : 1

HUNTER'S BAG REPORTS

In an attempt to evaluate hunter selectivity, Miss May Thacher Cooke, of the U. S. Fish and Wildlife Service, and the author sorted return cards for 9,311 banded ducks of three species shot by hunters. Inasmuch as the sex ratios of these species were determined by Lincoln (*op. cit.*) for banded birds before being hunted, it was thought that computation of their sex ratios after being shot would indicate whether selectivity was practiced by hunters, knowingly or unknowingly. Time limitations restricted analysis of return records of ducks marked "killed" or "shot" by hunters to the following:

State[1]	*Size of Sample*[2]	*Males*	*Females*	*Not Sexed*	*Totals*	*Ratio M:F*
		MALLARD				
Illinois	25%	384	143	4	531	
Louisiana	33%	135	134	78	347	
Montana	20%	271	183	24	478	
Oregon	20%	145	119	12	276	
Kansas	33%	223	128	46	397	
Minnesota	16%	146	101	7	254	
Br. Columbia	20%	258	219	40	517	
North Dakota	25%	165	238	10	413	
Missouri	45%	190	139	146	475	
Michigan	35%	182	166	119	467	
Wisconsin	30%	168	240	33	441	
Totals	16%	2267	1810	519	4596	1.25 : 1
		PINTAIL				
Br. Columbia	33%	150	249	19	418	
California	20%	379	118	71	568	
Kansas	50%	214	142	65	122	
Louisiana	20%	270	127	3	400	
North Carolina	100%	59	35	6	100	
Totals	8%	1072	671	164	1908	1.59 : 1
		LESSER SCAUP DUCK				
U. S. and Canada	20%	348	191	239	778	1.82 : 1

Referring to Lincoln's data, given previously, it is seen that the sex ratios of shot, banded Mallards, Pintails, and Lesser Scaup Ducks, at least, are about the same as those derived from banding-trap records of these species, indicating negligible sex selection by hunters. As discussed earlier, if this is true, then Hawkins's findings rather defi-

[1] State or province where banded; may have been shot anywhere.
[2] Approximate percentage of total cards on file for the state.

nitely imply that banding traps, at least in Illinois, attract more female than male Mallards.

Hochbaum's (1940) belief, based upon almost even sex ratios or excesses of females (see Table 2), that female ducks of a few species were selected by Manitoba hunters, does not agree with the above data, probably being influenced by differential sex migration or distribution (see beyond).

SIGHT OBSERVATIONS

There can be little doubt but that accurate sight counts (or studies of clear photographs) of sexually distinct species of ducks on open waters is a reliable method of determining sex ratios. Unless it can be shown that one sex differentially prefers adjacent coverts, careful tallies of easily visible flocks reveal true sex ratios for the particular time and place concerned. Despite the ease with which such counts may be made, however, few studies of this nature appear to have been recorded in the literature.

In Europe, Frieling (*in* Erickson, 1943) compiled sex-ratio data on 21,764 ducks of ten species. In this country, Erickson (1943) made sex counts of 6,008 ducks of fifteen species migrating through Minnesota, and Furniss (1938) made similar studies on Saskatchewan breeding grounds in spring. For the most part, these investigators found the disparity in the abundance of birds of each sex to be significantly less than that assigned to these species as a result of study of banding-trap records.

The present author, from October, 1941, through February, 1942, and from October, 1942, through March, 1943, studied the sex ratios of several duck species by means of direct censuses at the Roaches Run Waterfowl Sanctuary, Washington, D. C. This area, one of the National Capital Parks, administered by the National Park Service, is situated on the southern bank of the Potomac River but is largely included within the District of Columbia. It is within easy sight of the Washington Monument and Capitol. During the two winters, censuses of the 500 to 1200 birds usually present on the 62 acres of open water included within the refuge were made several times a month, whenever opportunity permitted. Direct counts were easily accomplished during early mornings as the birds drifted away from several feeding places. Very limited cover, found to be largely unoccupied by ducks, was present in winter.

Excluding Black Ducks and small numbers of miscellaneous species, the following data are derived from a total of 13,534 bird observations. The figures for the American Merganser include birds seen

in the near-by Potomac River and Tidal Basin. Because of the relatively small numbers of Mallards and Mergansers, data for both years are lumped together. Since the construction of the adjacent National Airport, with consequent silting of submerged food plants, the diving ducks listed elsewhere in this paper no longer appear at Roaches Run in numbers sufficient to warrant study.

TABLE 1

SEX RATIOS OF DUCKS COUNTED AT ROACHES RUN, D. C., 1941–1943

Species	*Years*	*October*	*November*	*December*
Pintail	1941–2	116 162	1486 1032	1434 932
	Ratios	*0.71 : 1*	*1.44 : 1*	*1.53 : 1*
	1942–3	111 333	262 303	1041 848
	Ratios	*0.33 : 1*	*0.86 : 1*	*1.23 : 1*
	1941–3	227 495	1749 1335	2487 1780
	Ratios	*0.46 : 1*	*1.35 : 1*	*1.39 : 1*
Mallard	1941–3	37 23	183 108	166 96
	Ratios	*1.60 : 1*	*1.69 : 1*	*1.73 : 1*
American Merganser	1941–3			197 29
	Ratios			*6.79 : 1*

Species	*Years*	*January*	*February*	*March*	*Total*
Pintail	1941–2	818 643	220 200		4074 2969
	Ratios	*1.27 : 1*	*1.10 : 1*		*1.37 : 1*
	1942–3		741 501	643 510	2798 2495
	Ratios		*1.48 : 1*	*1.26 : 1*	*1.12 : 1*
	1941–3	818 643	961 701	643 510	6872 5464
	Ratios	*1.27 : 1*	*1.37 : 1*	*1.26 : 1*	*1.26 : 1*
Mallard	1941–3	46 32	54 35	53 50	539 344
	Ratios	*1.56 : 1*	*1.54 : 1*	*1.06 : 1*	*1.56 : 1*
American Merganser	1941–3	2 2	25 15	30 15	254 61
	Ratios	*1 : 1*	*1.66 : 1*	*2 : 1*	*4.16 : 1*

Comparing these results with data compiled by other investigators (see Table 2), it is seen that the sex ratios of ducks at Roaches Run vary from those determined for these species elsewhere in North America; which brings up the factors of differential sex migration and distribution as affecting the accuracy of sex-ratio data.

DIFFERENTIAL SEX MIGRATION AND DISTRIBUTION

Table 2 summarizes the results of a number of American sex-ratio studies published to date:

TABLE 2

RECORDED RATIOS OF MALES TO EACH FEMALE DUCK

Species	*Banding traps*				*Hunters*		*Field counts*		
	Lincoln (1932) U. S.	McIlhenny (1940) Louisiana—winter	Hawkins (1940) Illinois—fall	Hodge—Roaches Run Wash., D. C.—winter	Hawkins (1940) Illinois—fall	Hochbaum (1939) Manitoba—fall	Furniss (1938) Saskatchewan—spring	Erickson (1943) Minnesota—spring	Petrides, Roaches Run Wash., D. C.—winter
Mallard	1.27	1.00	2.86	1.67	1.33	0.74	1.57	1.01	1.56
Black Duck	1.38			2.24					
Pintail	1.68	1.98		1.72		0.40	1.90	1.16	1.26
Canvas-back	1.78	1.74		3.81		1.11	1.36	1.77	
Lesser Scaup Duck	1.82	2.22		2.37		1.03	1.47	2.56	
American Merganser								0.88	4.16
Redhead							1.08	1.56	
Ring-necked Duck	3.69	3.35					1.26	1.39	
Wood Duck	1.07	1.67							
Blue-winged Teal	1.86	1.80						1.48	
Green-winged Teal	3.75	2.33							
Baldpate	1.64							1.21	

Obviously, considerable disparity of results exists even for a single duck species studied by one method. Sex ratios in banded Mallards, for instance, vary from 1.00 : 1 in Louisiana (winter) to 2.86 males per female in Illinois (autumn). Even more in contrast are the ratios for American Mergansers: 0.88 : 1 counted by Erickson in Minnesota, and 4.16 : 1 enumerated by the author at Washington, D. C.

Despite observations made some years ago that female Mallards (Leopold, 1919, 1920) and American Mergansers (Phillips, 1925) migrate earlier than males of their species, the geographic variation in sex ratios indicated above emphasizes our lack of exact knowledge regarding differential sex distribution, as well as migration, in wintering waterfowl.

That differential sex migration occurs in the Pintail seems evident from Table 1, and if McIlhenny's data (1940) for 3,674 birds trapped in Louisiana are comparable, his ratio of 1.98 : 1 as contrasted with 1.26 : 1 for Washington, D. C., indicates a differential winter distribution.

Commenting upon the Pintail data in Table 2, however, F. C. Lincoln (personal letter) states that "it is a fact that large numbers of [Pintail] drakes . . . migrate much earlier than do the hens" (rather than the reverse as indicated by the Roaches Run data) and cites an

instance where males in eclipse plumage were seen at the Salton Sea, California, in August. He suggests that some males in eclipse plumage may have been counted as females at Roaches Run. Neither Mr. Lincoln nor the author, however, have ever seen eclipse males at Washington, D. C., although Pintails have nested at Roaches Run under unusual circumstances (Auk, 50: 437–438, 1940).

That differential sex distribution may be a disconcerting factor in determining sex ratios on a continental basis is apparent when the locations of waterfowl banding stations are considered. The May, 1933, issue of Bird Banding Notes (vol. 2, no. 8, pp. 115–116) lists the stations in operation the previous winter season, giving the number of ducks trapped. When a dot is placed on a map for every 100 ducks banded in a given locality, large concentrations are found to occur in the southern New England, British Columbia, Oregon, San Francisco Bay, and southern Louisiana regions; few dots are located in other areas. Waterfowl throughout most of the vast expanse of the nation have received relatively little attention and conditions in Mexico and other southern areas, where female ducks may be comparatively more abundant, seem to be largely unknown.

Furthermore, the banding return records filed by the U. S. Fish and Wildlife Service for some species represent only a few localities. At the present time, apparently over 90 per cent of the return cards for the Lesser Scaup Duck, for example, have been submitted by E. A. McIlhenny from southern Louisiana. Similarly, very few returns of Pintails banded east of the Mississippi River are available, though many birds evidently winter there. It would seem quite possible, therefore, that early sex-ratio studies of banded birds might have been affected by faulty geographic sampling as well as by selectivity of traps.

Conclusions and Suggestions for Research

Though it seems probable from the total number of observations of all kinds that a preponderance of males exists in most ducks, it seems quite possible that the extent to which sex ratios are unbalanced has been exaggerated, due to insufficient sampling of large geographic areas and to reliance on untested methods of gathering data.

In view of the ease with which accurate sex ratios can be obtained, more professional and amateur ornithologists should endeavor to report sight observations made over periods of several years. Banding-trap operators might easily test the reliability of sex ratios derived from banding records by comparing the sex ratios of birds trapped by them with those derived from counts of untrapped birds observed in their regions. Similarly, conservation organizations conducting

game-bag surveys could check the validity of their data by simultaneously conducting direct censuses on suitable sample areas.

SUMMARY

Limited evidence indicates that banding traps may be more attractive to male than to female ducks. Records of banded ducks before and after hunting, when compared, reveal similar sex ratios, indicating negligible sex selection by sportsmen. Sight observations are believed best to permit accurate determinations of local sex ratios, and data from Washington, D. C., are provided. Tabulation of all published American sex-ratio data reveals a geographic variation probably due to differential sex migration and distribution—factors which doubtless affected early records of nationally unbalanced sex ratios. More thorough sampling of the continent's wintering grounds is advocated and methods for testing the validity of sex-ratio data derived from banding-trap records and hunter's-bag reports are given.

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SOUTHWARD MIGRATION OF ADULT SHOREBIRDS ON THE WEST COAST OF JAMES BAY, ONTARIO

BY C. E. HOPE AND T. M. SHORTT

WHILE the writers were making the 100-mile trip by canoe from Fort Albany to Moosonee between July 15 and 25, 1942, opportunity was afforded to witness the southward migration of adult shorebirds of many species. Observations were made at three principal stations—at the mouth of the Albany River on July 15; at the mouth of the Nettichi River, which is about 20 miles south of the Albany from the 16th to the 20th; and fifty miles south of the Nettichi River where we camped at Big Piskwanish from July 20 to 25. The trip was completed to Moosonee on the afternoon of the 25th.

The first marked flight was observed on July 17. From then on to the conclusion of the trip, shorebird movement was conspicuous. The period covered by our observations was too brief to reveal the duration of the flight of any one species. Most were recorded daily throughout the period, but specific ratios varied from day to day. One day would be characterized by tremendous flocks of Knots, but their numbers would be diminished the next day and Pectoral Sandpipers, or Hudsonian Curlews, or Semipalmated Sandpipers would predominate.

While most of these flights moved in a southerly direction, some curious reverses were noted. One instance occurred on the morning of July 22, which was cloudy with slight fog. A tremendous northward movement of shorebirds was taking place, consisting of Hudsonian Curlews and Knots, with good numbers of Greater Yellow-legs, Pectoral Sandpipers, Semipalmated Sandpipers and Sanderlings and an occasional flock of Turnstones. The line of flight was, as usual, at the edge of the tide and as the tide receded so did the line of flight. This northward movement continued unabated till midday, when the flight suddenly reversed. The sudden change of direction appeared to coincide with the change of the tide which commenced to come in again about noon.

Another flight was observed on the evening of July 24 at dusk, when the tide was high. We witnessed an enormous flock of shorebirds, stretched out for a distance of a mile or more as a dense, long cloud moving in a northerly direction. Though they were too far out to be identified, through binoculars, we could see that small, medium-sized, and large shorebirds were in the flock.

An interesting feature of the shorebird migration during the period of our observations was that all specimens obtained and all that we

satisfactorily observed were adult birds. No young of the year were noted whatever. All of the specimens collected were very fat and in good physical condition though plumage replacement was rarely complete.

The annotated list, which follows, comprises a total of fifteen species.

BLACK-BELLIED PLOVER, *Squatarola squatarola*.—No marked flight of this species was noted, but a few were seen and heard from each camp.

RUDDY TURNSTONE, *Arenaria interpres morinella*.—These were first seen on July 22 from our camp at Big Piskwanish. Singles and small flocks were moving southward that day among the vastly larger flocks of other species. From that date on, a few migrating Turnstones were noted but no heavy flight took place.

HUDSONIAN CURLEW, *Numenius phaeopus hudsonicus*.—On the afternoon and evening of July 17, we observed from our camp at Nettichi River the first major southward movement of shorebirds. Many Hudsonian Curlews took part in this flight. From that date to the conclusion of our observations, the migration of curlews continued unabated. Migrating flocks rarely numbered over fifty individuals, but on several occasions flock followed flock in endless succession for a period of three to four hours. These flights generally took place in late afternoon and evening but pronounced movements also occurred in mid-morning. When feeding, they frequented the grass marsh and the tidal flats. These stops for rest and feeding took place from noon to late afternoon and again in the evening toward sun-down.

Fifteen specimens were taken from these flocks from July 21 to 24, inclusive. All were adults in very worn breeding plumage and all specimens of both sexes showed bare brooding patches. The postnuptial molt had just commenced in these birds and a few new feathers can be found on their heads, necks, and backs. Although these specimens were taken entirely at random, there was a heavy preponderance of males over females; the latter were represented by only two of the fifteen specimens. All of the birds taken had the feet and legs grayish-blue (Dark Glaucous-Gray of Ridgway's 'Color Key'). This is of interest since Sutton in 'The Birds of Southampton Island' (Mem. Carnegie Mus., 12, part 2: 121, 1932) records an adult with green legs and feet.

GREATER YELLOW-LEGS, *Totanus melanoleucus*.—This species was first noted on July 15 on Albany Island at the mouth of the Albany River where about thirty were feeding with a number of Lesser Yellow-legs scattered over the brackish pools. From there to the Moose River we encountered them in large numbers.

This species preferred to feed in the brackish pools beyond high-tide line and was seldom seen on the exposed muddy tide flats. Seven specimens, four males and three females, were taken from July 16 to 22. In plumage they were more advanced in the post-nuptial molt than Hudsonian Curlews taken on the same date.

LESSER YELLOW-LEGS, *Totanus flavipes*.—This was not so abundant during the period of our observations as the Greater Yellow-legs but was seen daily from July 15 to the conclusion of the trip. Two specimens, a male and female, were collected.

AMERICAN KNOT, *Calidris canutus rufus*.—The first Knots were observed at Big Piskwanish on July 20 when large flocks were seen on the tide flats. From then until our trip was concluded, huge flocks of Knots were a feature of the migration. Some of these flocks contained from two hundred to five hundred birds. Knots were frequently seen in company with other shorebirds and appeared to be partial to joining flocks of Hudsonian Curlews. Six males and five females were taken. They are still largely in nuptial plumage but exhibit varying degrees of molt. The replacement is largely on the crown, back, and scapulars. Two females show the greatest advancement in this respect.

PECTORAL SANDPIPER, *Erolia melanotos*.—This species was first observed on July 17, when small flocks joined the southward flight. They became progressively more conspicuous during the period of our observations. On July 23 and 24, many flocks numbering several hundreds were seen. Pectoral Sandpipers migrated in association with the Hudsonian Godwits. Sometimes a pure flock of each species would be seen in close association, flying in convoy style, and on other occasions mixed flocks were noted. They also flew with Hudsonian Curlews and among huge flocks of Semipalmated Sandpipers.

Six specimens were collected. Most of these birds were still in the nuptial plumage and two of the males still had the skin of the throat and breast loose, flabby, and fat as in the breeding season; some specimens, however, show considerable replacement in the back and chest feathers.

WHITE-RUMPED SANDPIPER, *Erolia fuscicollis*.

BAIRD'S SANDPIPER, *Erolia bairdii*.—White-rumped and Baird's Sandpipers were noted only on rare occasions and then usually one or two in company with larger groups of Semipalmated Sandpipers or Sanderlings.

LEAST SANDPIPER, *Erolia minutilla*.—No pronounced flight of Least Sandpipers was seen. An occasional small flock was noted on the wing

but the species was more frequently encountered on the brackish pools above the tide line where pairs and individuals were quietly feeding. They still behaved rather like breeding birds and it was believed that a full-scale migration had not yet begun.

RED-BACKED SANDPIPER, *Erolia alpina sakhalina*.—This species was noted in small numbers nearly every day, moving in a more or less desultory fashion, and it was evident that a big movement had not yet got under way.

SEMIPALMATED SANDPIPER, *Ereunetes pusillus*.—This species was migrating in great numbers throughout the entire period of our observations. It was the most abundant species taking part in the migration and some of the larger flocks were estimated to contain up to four or five thousand birds. Flocks often contained small numbers of other shorebirds. A common associate of this species was the Sanderling.

HUDSONIAN GODWIT, *Limosa haemastica*.—Two of these were seen on July 20 at Big Piskwanish. On the 23rd, a number of flocks totalling at least 1000 birds passed our camp during a period of about an hour and a half in mid-day. The day was calm with low-hanging fog. On the 24th, about 200 migrating Godwits were seen. The day was very cold with a fine misty rain falling and little wind. On the 25th, one was seen at Big Piskwanish in the morning and in the afternoon one was observed flying south about twenty miles south of Big Piskwanish and approximately four miles offshore.

The Godwits travelled in flocks of from 5 to 125, with most of the flocks numbering between 60 and 70. They flew in broad flat V's and crescent-shaped lines with very little wavering or changing of formation. Their flight was remarkably swift and direct. The wing beats were rather shallow but powerful, and the sound of the rush of wings was plainly audible as a flock passed over at their usual altitude of about 200 feet. The flight call was a modulated trill which we found virtually impossible to distinguish from the flight notes of the Hudsonian Curlew. They were perhaps less noisy than flying curlews. The specimens obtained, six males and four females, showed a range from badly worn breeding plumage to almost complete winter plumage.

It was something of a surprise to encounter this species in such large numbers since it has been considered to be on the verge of extinction. The fall migration route of the Hudsonian Godwit is rather imperfectly known. Preble (Biol. Invest. Hudson Bay Region, N. A. Fauna, no. 22, 1902) found them migrating north of York Factory

on Hudson Bay. They are later found on some of the islands in the Gulf of St. Lawrence, but the route followed from the west coast of Hudson Bay to the Gulf was a matter of conjecture. The discovery of migrating flocks far down the west coast of James Bay coupled with records from Rupert House indicate that the main flight follows down the west coast of Hudson and James bays to the southern extremity and then presumably moves overland in an east-southeasterly direction across the narrow part of the Ungava Peninsula to the Gulf of St. Lawrence.

All specimens obtained had dusky-brown feet and legs, with the soles of the feet paler and greenish-gray. The bills of those specimens most advanced in the post-nuptial molt were pale rosy-pink, dusky on the ridge and virtually black at the tip. Two males, however, which were still largely in nuptial plumage but with the molt commenced, had still a trace of the orange coloration on the bill characteristic of spring. The irides were dark brown. In was interesting to observe how quickly the bright coloring of the bill in this species faded. In little more than half an hour the rosy blush had faded to a livid white.

SANDERLING, *Crocethia alba*.—The Sanderling was noted throughout the trip as an abundant migrant. At Big Piskwanish they passed our camp in flocks containing several hundred individuals. They frequented the tide flats exclusively and none was seen in the salt marsh. This species associated most frequently with the dense flocks of Semipalmated Sandpipers.

Five males and one female obtained between July 20 and 24 are all in worn breeding plumage with traces of the post-nuptial molt, most pronouncedly evident on the back.

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A COLOR ABNORMALITY IN THE SLATE-COLORED JUNCO

BY ERNST CASPARI

MOST of our knowledge concerning developmental physiology has been derived from the observation of abnormal specimens. In most cases, the abnormalities have been experimentally induced, for only in such instances is it possible to draw any conclusions as to the causal factors for the deviation. On the other hand, the description of nat-

urally occurring abnormalities may throw some light on a developmental process by indicating the developmental possibilities within a given species. It is with this idea in mind that the following color abnormality is being described. It has a certain bearing on the question of pattern determination in birds, a problem which is now being experimentally attacked by numerous authors.

Junco hyemalis has a relatively simple surface pattern. The wings, back, head, throat, and upper breast are colored, with the shade depending somewhat upon sex, season, and region of the body. The two outer rectrices of the tail and the outer vane of the third rectrix are white; the inner vane of the third rectrix and the inner rectrices, colored. The lower breast and belly appear white. The lack of pigment, however, is restricted to the apical, pennaceous part of the feathers, whereas the basal downy part contains dark pigment in the nodes of each barbule. A similar differentiation occurs in the feathers of the back where the downy part contains pigment in the nodes only, as in the ventral feathers, while the pennaceous part consists of wholly black barbules. The transition between downy and pennaceous parts is gradual with regard to barbule shape as well as pigmentation; some intermediate barbules are found in between.

The specimen to be described is a male which was killed at Easton, Pa., on November 24, 1895. It was given to the collection of Lafayette College by Mrs. James B. Neal. At first sight, it appears completely white, and it has, indeed, been labeled "albino." On closer inspection it is seen, however, that the downy basal part of the ventral feathers is pigmented. As a matter of fact, the feathers of the belly and lower breast are very similar to those of a normal bird, both macroscopically and in their finer structures. The white apical area is perhaps somewhat more extended, on the average, than in normal feathers.

On the other hand, all dorsal feathers of the bird, which usually are pigmented to the tip, as well as the three outer rectrices, are white and without any pigment. The structure of these white feathers has been studied in contour feathers of the back. They are well-differentiated into morphologically normal, filamentous, hook-bearing barbules in the pennaceous part, and morphologically normal barbules with nodes in the downy part. Both types of barbules are without any pigment. The pigmentless down barbules resemble a type which is rarely found in normal birds at the point of transition from the pigmented down to the white pennaceous part in ventral feathers. The morphologically normal appearance of these pigmentless barbules

is in contrast to the finding of Chandler (1916) in an albino Mallard, where morphological structures normally contributing to the coloration were absent. The label indicates that the iris of the described bird was pink.

It is clear from this description that the bird was not an albino, since it was able to form pigment. Furthermore, it seems likely that it was not a genetic mosaic. For under this hypothesis it would be assumed that the genetic change had taken place in an ancestor cell common to all aberrant tissues. The mosaics and gynandromorphs described in birds show either irregular patches of the mutated tissue, or they are bilateral mosaics; right and left sides are genetically different. The latter type is especially frequent in Passeriformes, in the relatives of *Junco:* in *Pyrrhula pyrrhula* (Lorenz, 1894; Neunzig, 1924; Heinroth, 1909; Tickhomiroff, 1918; Ogneff, 1924; and Zawadowski, 1926); in *Fringilla coelebs* (Weber, 1890); and in *Serinus canarius* and *Gouldaeornis gouldiae* (Crew and Munro, 1938). The occurrence of animals of this kind suggests that in birds the first cleavage is approximately coincident with the later median sagittal body axis. At all events, it would be difficult to imagine common ancestor cells for the epidermis of belly and lower breast on one side, and for the epidermis of head, throat, higher breast, back, wings, and tail, perhaps also including the iris, on the other side.

The most striking feature in the abnormal bird is the fact that the boundary between pigmented and unpigmented feathers is coincident with the boundary between fully and partially pigmented feathers in the normal bird. This fact suggests that the abnormality is dependent upon pattern determination. The dorsal regions including the rectrices did not produce pigment on account of some developmental influence—whether genetic or environmental cannot be decided—whereas the regions determined to give the characteristic pigmentation of the lower ventral area either did not react at all or reacted to a slighter degree.

Comparable cases of different reactivity of different pattern elements to internal and external factors have been described. The gene 'black and tan' in the house mouse (Dunn, 1928) causes a sharper difference in pigmentation between the dorsal and the ventral areas than is observed in agouti and full-colored mice. Dunn suggested that this pattern is always present but becomes more conspicuous because of the different pigmentation of the two areas under the influence of the 'black and tan' gene. This view has since been proved experimentally by Reed and Sander (1937). On the wing of the

meal-moth (*Ephestia kuehniella*), two different pattern elements, the central field and the outer field, which are divided from each other by border differentiations, have the same type of pigmentation in wild-type animals. Differences in coloration between these two areas, however, arise under the influence of certain genes (Whiting, 1919; Kuehn, 1937) and after treatment with CO_2 (Strohl and Koehler, 1934). It seems likely that the abnormality in the described bird is due to a process similar to those in the quoted cases.

Some remarks are necessary concerning the eye-color of the abnormal bird. The assumption that the pigmentation of the iris was reduced concomitantly with the reduction of pigmentation in the dorsal area is based on the remark in the label only. It is, however, difficult to imagine that the dark brown, normal iris pigmentation of *Junco* should have been mistaken for pink by the observer. It must be noted that several genetic factors influencing the distribution of pigment on the body surface affect at the same time the iris pigmentation. Castle (1924, 1934) described wall eye and heterochromia iridis in homozygous white Dutch rabbits and in heterozygous Vienna white rabbits. Similar effects have been found in dogs by Mitchell (1935) under the influence of the gene for merle-dilution coat color.

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NOTES ON SOME VIRGINIA BIRDS[1]

BY C. E. ADDY

VIRGINIA is a state of varied climate, soil, and topography. The eastern coastal plain is low and humid, but the mountains of the southwestern part rise to over 5000 feet. The region lies between what is called 'the north' and 'the deep south.' It is not surprising, therefore, that in some 25 species of birds, northern and southern subspecies are known to adjoin or intergrade within the confines of the state. Placing these intergrades is not easy and plotting the distribution of the subspecies requires systematic collecting and careful identification of specimens.

As a start toward the solution of these various subspecies problems, a paper entitled 'Notes on the Distribution of the Loggerhead and Migrant Shrikes in Virginia' was published by Addy and Handley in The Raven, Vol. 11, No. 7, July, 1940. Although 20 specimens were collected from various parts of the state and identified, the paper is by no means complete, for considerable collecting has yet to be done, especially of nesting birds, before the status of *Lanius ludovicianus ludovicianus* and *L. l. migrans* can be definitely determined.

The present paper concerns a number of specimens in the Virginia Polytechnic Institute collection taken during 1938–1941. The author is indebted to Allen J. Duvall and Dr. Alexander Wetmore of the Smithsonian Institution, W. E. C. Todd of the Carnegie Museum, and Dr. George M. Sutton of Cornell University for assistance in checking the specimens and reviewing the manuscript.

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Southern Robin, *Turdus migratorius achrusterus* Linnaeus

Nine of eleven robins (6 male, 3 female) examined approach *achrusterus* in color and wing measurements, and according to Dr. Alexander Wetmore may be referred to this race although in all the specimens the tail is well over 90 mm. (95–99 mm.) long. Wing measurements varied from 123 to 128 mm. Winter, spring, and summer specimens are included in the series. Apparently this form is the predominant nesting bird of the state since summer birds collected at Blacksburg (elev. 2100 ft.) in the mountains and at Danville (elev. 500 ft.) in the Piedmont near the North Carolina line are of this race.

Eastern Robin, *Turdus migratorius migratorius* (Batchelder)

One nesting robin from the mountains of Highland County is larger in wing (131 mm.) and tail (104 mm.) and has a black head and back; the latter characters apparently are unusual in *achrusterus*. This would tend to indicate that *migratorius* is the nesting bird at least of the high mountains of that section. To substantiate this further, J. J. Murray reports in The Raven, Vol. 9, Nos. 11 and 12, 1938, that three specimens of *T. m. migratorius* were collected on Middle Mountain and vicinity in June, 1938.

One winter specimen from Blacksburg (wing, 131, tail 104 mm.) is typical of *migratorius*, indicating that both the northern and southern races winter within the boundaries of the state.

Northern Carolina Chickadee, *Parus carolinensis extimus* Todd and Sutton

According to Dr. George M. Sutton, two chickadees collected in the mountains of southwestern Virginia are shorter-winged (62–63 mm.) than the type of *extimus* (wing, 67 mm.), but in whiteness of wing-edgings and warmth of flank color are close to seasonally comparable Bethany, West Virginia, birds.

Northern Blue Jay, *Cyanocitta cristata bromia* Oberholser

One specimen of *Cyanocitta cristata bromia* collected in June in Rockbridge County was a nesting bird. An April specimen of this race from Blacksburg, though not definitely a breeding bird, establishes the possibility that the northern form of Blue Jay nests south in the mountains of Virginia at least as far as Montgomery County. The two remaining specimens, taken in the fall at Blacksburg and Mountain Lake, are of the northern race as would be expected.

Northern Downy Woodpecker, *Dryobates pubescens medianus* (Swainson)

Of the seven Downy Woodpeckers (6 male, 1 female) examined, none were breeding birds. However, fall, winter, and early spring birds from the mountains of southwestern Virginia are all good specimens of *D. p. medianus* (wing, 94; tail, 53–57; bill, 18 mm.). Three specimens from extreme southeastern Virginia may also be referred to this race although the measurements of one male (wing, 91; tail, 53; bill, 17 mm.) from Brunswick County, verge toward those of *D. p. pubescens*, the southern race. It is possible that the northern and southern forms intergrade in the southeastern part of the state, and in order to determine whether *D. p. pubescens* occurs in that locality, more specimens, especially of nesting birds, should be obtained.

Eastern Hairy Woodpecker, *Dryobates villosus villosus* (Linnaeus)

Two specimens of Hairy Woodpecker, one an immature male (wing, 118; tail, 70; bill, 28 mm.) collected in Charlotte Co. in May, and the other an adult male (wing, 122; tail, 69; bill, 30 mm.) collected in Montgomery County in December, were identified by Dr. Sutton as *Dryobates villosus villosus*. The immature male would indicate that *villosus* is possibly the nesting race of Hairy Woodpecker as far south as the Southern Piedmont in Virginia.

Southern Flicker, *Colaptes auratus auratus* (Linnaeus)

Three Flickers from Montgomery County, a breeding male (wing, 149; tail, 98 mm.) collected in April and two immature males (wing, 146; tail, 92, 95; bill, 30, 31 mm.) collected in July, suggest the possibility that the southern form is the predominant nesting Flicker of the state.

Northern Flicker, *Colaptes auratus luteus* Bangs

Four other specimens of Flickers (2 males, 2 females) taken in Montgomery County in April, September, and December and apparently transients, are definitely referable to *C. a. luteus* the northern race (wing, 152–159; tail, 103–112; bill, 32–34 mm.).

Southern Screech Owl, *Otus asio asio* (Linnaeus)

One female specimen from Isle of Wight County, taken in March, may be assigned to the southern form, *O. a. asio* (wing, 153; tail, 77 mm.) though not typical in all respects.

Eastern Screech Owl, *Otus asio naevius* (Gmelin)

Three male winter specimens of Screech Owls from Winchester, Blacksburg, and Mountain Lake are definitely large (wing, 161–165;

tail, 77–81 mm.) and are considered the northern race, *O. a. naevius*. Though Screech Owls do not, as a rule, migrate to any great extent, they do wander at times so that it is imperative that nesting birds be obtained from various parts of the state in order to determine the true status of *O. a. asio* and *O. a. naevius*.

"Appalachian Ruffed Grouse, *Bonasa umbellus monticola* Todd"

In December, 1940, a series of 35 Ruffed Grouse specimens, composed of 18 males, 2 (?) males and 15 females collected mainly in October, November, and December, was taken to the Carnegie Museum at Pittsburgh, Pennsylvania, and compared with the type series of "*monticola*." The specimens from the mountains of Virginia compared favorably with the type and other specimens from West Virginia. Compared with the series of *B. u. umbellus* from Pennsylvania at the Carnegie Museum, the Virginia birds as a group were consistently darker on the upper parts, with heavier barring and more pronounced buffy wash on the under parts. No specimens of *B. u. togata* were available for comparison.

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CLUTCH-SIZE IN INTRODUCED BIRDS

BY R. E. MOREAU

DURING the last few years I have been collating records, both published and unpublished, of the clutch-sizes of African birds (a) within 5° of the equator and (b) south of 25° S., with the primary object of ascertaining the prevalence, or degree, of difference in clutch-size with latitude throughout an entire avifauna. Although most of the data are not stated in a form that makes a strict statistical investigation possible, the analysis, which I hope will be published elsewhere, shows that the equatorial clutch-size is the larger in less than four per cent of species, while the South African clutch-size is the larger in 38 per cent of the species. But most of the differences amount to less than one egg whereas, compared with those of closely allied British birds, the South African clutch-sizes for the most part run much more than one egg smaller.

Hypotheses readily present themselves to account for the fact that British birds have bigger clutches than closely comparable birds in South Africa. It is much more difficult to think of a reason why South African birds should have bigger clutches than birds of the same species close to the equator. It occurred to me that we might perhaps get a useful slant on this problem if we could find out whether the

clutch-sizes of wild birds transported and established in new countries and new climates had altered.

I quickly found that critical information on the subject was very deficient indeed. Four British species are naturalized in very circumscribed areas in South Africa but apparently only the English Sparrow (*Passer domesticus*) and the Starling (*Sturnus vulgaris*) are at all numerous and only for the latter have I been able to obtain any records. Betham (1929) found the clutch of the Starling in South Africa to be normally five. In Britain it is "5–7, sometimes 8–9, 4 minimum" (Jourdain *in* Witherby *et al.*, 1938). Without more, and independent, information from South Africa no stress can be laid on this difference.

British species bulk very large in the avifaunas of Australia and New Zealand, but I have not succeeded in obtaining any local data of value for the present discussion. Dr. W. R. B. Oliver, the author of 'Birds of New Zealand,' has kindly informed me that the clutch-sizes therein quoted for British species are derived from British sources.

I turned more hopefully to the possibility of finding for the English Sparrow and the Starling in America not only critical data but perhaps also a discussion of their clutch-size in relation to locality or latitude. Since I have extremely little American literature available at Amani, in Tanganyika Territory, where I am resident, I applied to Mrs. M. M. Nice and Mr. F. C. Lincoln, who most kindly interested themselves in the question and went to considerable trouble on my behalf. In the result, considering the economic importance of these two species, surprisingly little information has been forthcoming, but the results are somewhat unexpected and suggest that more attention might profitably be devoted to the question.

Passer domesticus.—

The British clutch is given as "3–5, occasionally 6 or even 7" (Jourdain *in* Witherby *et al.*, 1938), from which it can be deduced that the average lies between 4 and 5. The clutch-size in North America has been generalized as "3 to 6" (Grosvenor & Wetmore, n.d.) and 3–7, usually 5–6 (Kalmbach, 1940).

For Ontario, Canada, Dr. Harrison F. Lewis, Chief Federal Migratory Bird Officer, Ontario and Quebec, has provided me with particulars of 23 clutches in the Royal Ontario Museum of Zoology. They average 4.65, and he notes that the true local average may be rather lower since there may be a tendency for collectors for a museum to prefer the bigger sets.

The following statements were transmitted to me by Mrs. M. M. Nice:—

(a) North Carolina: 3–7, average at least 5. "Sixes are common but fives are to be more often met with than any other number in my experience" (Alexander Sprunt, Jr., Montreal).
(b) Northeastern Florida: average 4.75. "Hundreds of nests examined" (S. A. Grimes, Jacksonville).
(c) Florida: 3–7, average 5–6 (Donald T. Nicholson, Orlando).

From the foregoing it seems that the average clutch in North America, from Ontario to Florida, is within .5 of 5.0. It is if anything, slightly bigger than the clutch of the same species in England, and the indications are that it is no smaller in Florida than in Ontario.[1]

Sturnus vulgaris.—

The British clutch has already been cited as "5–7, sometimes 8–9, 4 minimum," which indicates an average of at least 6. The North American clutch has been generalized as 3–6 by Cooke (1928); as "four or five" by Grosvenor & Wetmore (n. d.)

For the neighborhood of Ottawa, Mr. T. S. Hennessy of the Canadian National Parks Bureau, who has specialized on the banding of nestling Starlings, has, through Dr. Lewis, provided the data from 117 nests "believed to have contained a full complement of eggs or young when examined." The average is 4.19. Nine clutches in the Royal Ontario Museum of Zoology average 5 eggs each.[2]

From North Carolina, Mr. Sprunt writes: "Starlings almost invariably have 3 eggs. Sometimes 4 are found, but as yet the bird is not an abundant breeder with us."

DISCUSSION

The foregoing data, which it is very desirable to have supplemented, appear to show an interesting difference in response to their new environment by two species that have both made a notable success of 'muscling into' a rich continental avifauna. The English Sparrow which, with some assistance from man, has in ninety years spread from New York to Alaska and Mexico, seems to have, on the whole, at least retained and perhaps slightly increased its clutch-size in the process. Kalmbach (1940) notes, however, that, while it is here and there in the West still increasing its range and its numbers, east of the Alleghenies it seems to be on the decrease. It would be of great interest to know whether the clutch-size at the 'growing points' of

[1] Since this was written, I have seen the paper by R. L. Weaver in Auk, 60: 62–74, 1943. His average for 38 clutches at Ithaca, N. Y., is 4.75 eggs, a figure in close agreement with the foregoing, especially the Ontario average.

[2] Since these notes have been compiled, Dr. Lewis has transmitted Mr. Hennessy's results for 1942—an average of 4.15 in 26 nests.

the species' North American range is any different from that in areas where it is in retrogression.

The Starling, which has, on the whole, expanded much more irregularly than the English Sparrow, seems to have consolidated its advances while at the same time it has actually tended to reduce its clutch-size. It is conceivable that this may be connected with a more highly developed habit of migration—and vagrancy—than the English Sparrow's. There is also a suggestion that the Starling has a smaller clutch in the south of its North American range than in the north; whereas for the English Sparrow the indications are against any difference.

Incidentally, it may be worth stressing that the United States and Canada offer a splendid field for a study of the geographical variation of clutch-size. There is certainly a tendency for clutch-size to increase with latitude in Africa. Grote (1939) has produced evidence of increase from west to east—from equable to extreme 'continental' climate—in Europe. Differences may manifest themselves in even so small an area as England and South Scotland (Boyd, 1936). Differences of great interest may disclose themselves on the North American continent, as already foreshadowed by Skutch (1940).

SUMMARY

English Sparrows (*Passer domesticus*) in the U. S. A. and Canada average clutches no smaller than in Britain and no smaller in the south of their American range than in the north. Starlings (*Sturnus vulgaris*) have clutches appreciably smaller in North America than in Britain and perhaps smaller in the south of their range than in the north. Many more data are needed.

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THE PASSENGER PIGEON AS OBSERVED BY THE REV. COTTON MATHER

BY FREDERIC T. LEWIS

THE early records of "countless multitudes"—"millions of millions"—of Passenger Pigeons in New England have been gathered by Edward H. Forbush and published in his 'Game Birds, Wild Fowl and Shore Birds' (Massachusetts State Board of Agriculture: 433–472, 1912), and again in his 'Birds of Massachusetts' (2: 54–82, 1927). From his wide reading Mr. Forbush cites, among others, the comments of Governor Dudley, of Governor John Winthrop, and Roger Williams (1643); but the more scientific observations by Cotton Mather have apparently been overlooked. They are found in a curious book—'The Christian Philosopher: a Collection of the Best Discoveries in Nature, with Religious Improvements. By Cotton Mather, D.D., and Fellow of the Royal Society. London; Printed for Eman. Matthews, at the Bible in Pater-Noster-Row. MDCCXXI.' That octavo of viii and 304 pages is well described by its author as a "rhapsody," designed to show "how innumerable are the *Appearances* of Nature which are above the Powers of *Mechanism*." Two very popular books served as his models—one by "the industrious Mr. Ray" [RAY, JOHN. 'The wisdom of God manifested in the works of the creation.' First ed., 1691 (London); 12th ed., 1759 (London); and others later]; the other by "the inquisitive Mr. Derham" [DERHAM, WILLIAM. 'Physico-theology: or, A demonstration of the being and attributes of God, from His works of creation.' First ed., 1713; 13th ed., 1768 (London); and several later]. *"Fratrum dulce par"* writes Dr. Mather, in acknowledging his great indebtedness to their works, "and I give thanks to Heaven for them."

True to form, 'The Christian Philosopher' deals with the whole realm of nature, and abounds in quotations from all the authorities.

Dr. Mather had an imposing library, and consulted "some scores of philosophers" on this occasion. "Most certainly there can be very little Pretence to an I, or Me, for what is done in these *Essays.*" And more is the pity. Rarely can he say, as of a tapeworm "about one hundred and fifty foot long"—*"Hisce ipse vidi oculis"* ("I saw with my own eyes"; but "about 150 ft. long" apparently exceeds, several times over, the *authentic* measurements of single tapeworms from the human digestive tract).

Essay XXX, 'Of the Feathered,' is limited to nineteen pages, in which twenty authors are cited, from Aristotle and St. Basil to Coiter, Harvey, Ray, and Derham. Dr. Derham, indeed, had made "some nice microscopical observations" on the rows of little hooks which lock the barbs of a feather in perfect alignment. Although Derham figured them in his 'Physico-theology,' he thought it proper to relegate his own discovery to a footnote. SIR RICHARD OWEN ['Anatomy of Vertebrates,' 2: 233, 1866 (London)] remarks: "As the eloquent Paley well observes, 'every feather is a mechanical wonder'." Paley was impressed with Derham's discovery, and made the quoted comment in a book which Darwin once admired and knew almost by heart. [PALEY, WILLIAM. 'Natural theology,' 1802; 12th ed., 1809 (London); "some forty or more" editions by 1854, superseding Ray and Derham in the same field.] Mather, with a microscope of his own, could have verified that observation, and possibly did so. Yet he is content to write: "Let an Eye assisted with Glasses view the *textrine Art* of the *Plumage,* and as Mr. Derham justly says . . . (etc.)." There was evident need of Agassiz's advice, "Study nature, not books."

Among the native birds observed by the clergyman, the Passenger Pigeon alone was so familiar and remarkable that he brought it into his argument twice, and at some length. First Dr. Mather writes (p. 188):

> "Among other Curiosities of *Nidification,* I will mention one that is observed in *Pidgeons* of my own Country. They build their *Nests* with little Sticks laid athwart one another, at such distances, that while they are so near together as to prevent the falling through of their *Eggs,* they are yet so far asunder, that the *cool Air* can come at their *Eggs.* And the REASON for this *Architecture* of their *Nests!* 'Tis this; their *Bodies* are much hotter than those of other *Birds;* and their *Eggs* would be perfectly addled by the *Heat* of their Bodies in the Incubation, if the *Nests* were not so built, that the *cool Air* might come at them to temper it."

This is more explicit than the comment of Albertus Magnus ('De Animalibus,' Lib. 8, tr. 2, cap. 3, c. 1250) that the nests of pigeons are slack because, having warm bodies, they have no great need of warm nests—an opinion duly credited to Albertus and handed down

by Aldrovandi. Dr. Mather had no thought of experimental verification. Credulously he recorded (p. 190) that "The Conveyance of what *Colours* we please to the Fowl that is hatching, by our painting of the *Eggs*, is a Curiosity." CONRAD GESNER, in his 'Historia Animalium' [Liber 3: 471, 1555 (Zürich); 1585 (Frankfurt)], had remarked: "We have read, in a certain German manuscript, that they say that chicks are hatched of the color with which the eggs to be incubated have been dyed." Aldrovandi ['Ornithologiae,' tomus alter: 225, 1600 (Bologna)] quotes "Ornithologus," perhaps derisively, for citing that vague and anonymous assertion.

As to the pigeons, Mather continues (p. 192):

"I will add a Curiosity relating to the *Pidgeons*, which annually visit my own Country in their *Seasons*, in such incredible numbers, that they have commonly been sold for *Two-pence* a dozen; yea, one Man has at one time surprized no less than *two hundred dozen* in his Barn, into which they have come for Food, and by shutting the door, he has had them all. Among these *Pidgeons*, the *Cocks* take care of the *young* ones for one part of the day, and the *Hens* for the other. When they are taken, we generally take but *one Sex* at a time. In the Crops of the *Cocks*, we find about the quantity of half a Gill of a Substance like a tender *Cheese-Curd:* the *Hens* have it not. This *Curd* flows naturally into their *Crops*, as *Milk* does into the *Dugs* of other Creatures. The *Hens* could not keep their *young* ones alive when first hatched; but the *Cocks* do fetch up this *thickned Milk*, and throw it into the Bills of their *young* ones, which are so nourished with it, that they grow faster, and fly sooner than any other Bird among us. None but the *Cocks* which have young ones to care for, have this *Curd* found in their *Crops*. Kill one of those *Cocks*, and all the young ones pine away to death in the *Nest*, notwithstanding all that their Dams can do for them. See Sirs, and be instructed!

Masculus ipse fovet Foetus, atque incubat Ovis;
Conjugii servat foedera casta sui."

(Father pigeon incubates eggs, and looks after his chickens,
Chastely observing his bond — faithful to conjugal vows.)

In the preceding passage Dr. Mather has made a note of some novelty and importance. Indeed, Aristotle in the 'Historia Animalium,' according to Sir D'Arcy Thompson's translation (Oxford, 1910, p. 613a) had written: "When the young are born, he [the cock] will take and masticate pieces of suitable food, will open the beaks of the fledglings, and inject these pieces, thus preparing them betimes to take food." But Sir D'Arcy notes that most manuscripts and editions have it "saltish clay" rather than "suitable food" that the cock injects. Pliny ('Natural History,' transl. by H. Rackham, Loeb Library ed., 3: 359) observes that when the hen pigeon is producing a brood, "she receives comfort and attendance from the cock. For the chicks at first they collect saltish earth in their throat and disgorge

it into their beaks, to get them into proper condition for food." Twelve centuries later, Albertus (*loc. cit.*) is somewhat more explicit. "When the chicks are young and small," he writes, "the cock comes, and taking the chick's beak into his own, he opens it and pours in an earthy salty substance, so that from the sharpness of the salt the crops of the chicks are opened, and their appetite is stimulated: then alternately in turn father and mother feed the chicks." In modern times the Passenger Pigeon's need for salt was observed by the Indian Chief Pokagon, who wrote: "Certain it is, while feeding their young they are frantic for salt. I have seen them pile on top of each other, about salt springs, two or more deep" [MERSHON, W. B. 'The Passenger Pigeon': 206, 1907 (New York)].

Harvey ('De gen. anim.': Ex. 7, 1651) noted that in the whole family of pigeons (wrongly adding rooks) there is a regurgitation, from the crop, of macerated and prepared food with which the young are nourished "just as infant quadrupeds are fed with milk." Joh. Conrad Peyer ('Merycologia': 27, 1685) quotes this statement from Harvey to bolster his slight evidence that there are ruminant birds.

Following Cotton Mather's much more satisfactory account, the next advance was made by John Hunter, so often considered "the discoverer of the curious phenomenon," though some mention Peyer. In a famous essay, illustrated with two quarto plates, one of the crop from a pigeon when it had no young ones, and the other from a male pigeon while the female was breeding, John Hunter likens the change in the latter to what happens in the udder of female Mammalia during uterine gestation [HUNTER, JOHN. 'Observations on certain parts of the animal oeconomy.' 1786 (London); 2nd ed., 1792. On a secretion in the crop of breeding pigeons for the nourishment of their young; p. 191–197 of 1st ed.; p. 235–241 of the 2nd]. He described the product in the pigeon as coagulating into a curd, "not as being literally so, but as resembling that more than any thing I know." In the crop of the cock pigeon at the time the young were hatching, Hunter found "pieces of white curd mixed with some of the common food of the pigeon, such as barley, beans, etc." But what is fed to the young bird is at first only curd. "About the third day, some of the common food is found mingled with it; as the pigeon grows older, the proportion of common food is increased; so that by the time it is seven, eight, or nine days old, the secretion of the curd ceases in the old ones, and of course no more will be found in the crop of the young." Had Dr. Mather known of such graded infant feeding, he would have transferred to this point his pious exclamation—"Great God, we are amazed!" (*cf.* p. 151).

The graded feeding has been confirmed [LUMLEY, W. F. 'Fulton's book of pigeons, edited by Lewis Wright.' London, 1895, as quoted in C. O. Whitman's 'Behavior of Pigeons,' 1919 (Carnegie Publ. 257, vol. 3). *Cf.* also BEAMS AND MEYER, The formation of pigeon "milk," Physiol. Zool., 4: 491, 1931.] and the validity of every feature mentioned by Mather has now been determined. He was right in saying that, "when taken, we generally take but one sex at a time," since toward noon the hens leave their nests for food, air, and exercise, and the cocks take their place. "In a pigeon loft at about 2 o'clock, all the cock-birds are sitting"—the hens again in the evening and all the night. But the clergyman was in error in declaring that the hens do not produce the "thickened milk." Hunter found it in pigeons of both sexes, though the male "perhaps furnishes this nutriment in a degree still more abundant." Ordinarily there is no appreciable difference in the quantity produced by the two parents; and Dr. Oscar Riddle has had repeated instances of successful rearing of a pair of squabs by the female alone, or by the male alone, as a consequence of death or removal of one parent close to the time of hatching. Again Dr. Mather was right in asserting that because of the curd the young pigeons grow faster than other birds. Pigeons double their initial weight in three days; ducks (which grow rapidly) in six days; and poultry in nine days (KAUFMAN, L. 'Croissance du pigeon,' Biol. gen., 3: 107, 1927).

Mather's bold comparison of the "tender cheese-curd" with milk is now well established. Hunter, indeed, found that pigeon milk lacked sugar; but it is only slightly less rich in proteins, fats, and ash than rabbit's milk (MLLE. W. DABROWSKA. 'Sur la composition chimique de la sécrétion lactée du jabot du pigeon.' Compt. Rend. Soc. Biol., Paris, 110: 1091–1093, 1932). Histologically also, the crop secretion is comparable with milk, although it does not come from the detached outer ends of cells in branching glands, but from entire fatty cells desquamated from the free surface of a stratified epithelial field. Dr. Litwer, of Leningrad, has provided a full modern account of the process, with references to all the important preceding papers (Zeitschr. Zellforsch. u. mikr. Anat., 3: 695–722, 1926).

But the most remarkable confirmation of the analogy between crop-milk and mammary milk has been provided by Dr. Riddle and his associates. After finding that one of the products of the anterior lobe of the hypophysis, which they later isolated and named *prolactin,* is the specific stimulus for the enlargement and functioning of the crop-glands in pigeons, they showed that the very same product activates

the mammary glands of mammals. When prolactin is discharged into the blood of pigeons of either sex, not only does the crop-gland develop to a functioning state, but parental brooding and self-denying care of eggs and young will then characterize the pigeon's behavior. (RIDDLE, OSCAR, AND BRAUCHER, P. F. 'Control of the special secretion of the crop-gland in pigeons by an anterior pituitary hormone.' Amer. Jour. Physiol., 37: 617–625, 1931. RIDDLE, O.; BATES, R. W.; AND DYKSHORN, S. W. 'The preparation, identification and assay of prolactin.' *Ibid.*, 105: 191–216, 1933. RIDDLE, O. 'Prolactin.' Sci. Monthly, 47: 97–113, 1938. Also a personal communication for which the author is greatly indebted.)

If Cotton Mather had known the results of these latest hormone studies, would he have written his 'Christian Philosopher' to show the impotence of mechanism? Presumably he would reflect that the hypophysis is an appendage of the brain, and that the production and release of prolactin may not be as mechanical as an experimental injection. As Professor Whitman has said, "the birds certainly seem to understand what is going on." They may not be altogether predestined Calvinist birds. Since a mechanism is available for causing both parents to suckle their young, or for assigning that duty to either sex alone, there may be wisdom and purpose in the existing order in mammals and mankind. "Chance cannot govern it."

The Rev. Cotton Mather's observations are imperfect and antiquated, yet it is no small achievement to have anticipated John Hunter, while providing the best colonial account of the Passenger Pigeon, and suggesting a possible clue to its amazing abundance.

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NOTES ON THE RACES OF THE WHITE-BREASTED NUTHATCH

BY JOHN W. ALDRICH

IN the course of identifying White-breasted Nuthatches (*Sitta carolinensis*) from the state of Washington, in connection with the Fish and Wildlife Service's investigations on the birds of that area, the writer has reviewed the geographical variation of this species over its entire range. Since some of the facts revealed by this study do not appear to have been made clear previously in the literature, it would seem worth while to present them here.

Through the courtesy of A. J. van Rossem, an excellent series of

typical *Sitta carolinensis tenuissima* from central-eastern California and southern Nevada was made available for study. The type and a large series of topotypes of *nelsoni* from the Huachuca Mountains of Arizona were on hand in the U. S. National Museum, and through the kindness of R. M. de Schauensee the type specimens of *Sitta aculeata,* in the collection of The Academy of Natural Sciences of Philadelphia, was sent to me for study. Dr. Josselyn Van Tyne sent me a topotypical series of *oberholseri* from the Chisos Mountains of Texas, W. E. C. Todd made available the type series of *uintaensis* from the Uinta Mountains, Utah, and S. G. Jewett provided additional material from a critical area in Oregon and Washington. Major E. A. Goldman supplied much information from unpublished notes made by himself and the late Dr. E. W. Nelson, on the distribution and habitat of White-breasted Nuthatches in Mexico. Dr. Alden H. Miller has read the entire manuscript and favored me with numerous helpful criticisms, although he is in no way responsible for any of the conclusions reached herein. To all these individuals and institutions I wish to express my thanks.

With these specimens, in conjunction with a large amount of material from North America available to me in the U. S. National Museum, including the Biological Survey collection, it was possible to work out the characters of the least understood races which, up to the presesnt time, are those of the western United States.

Geographical Variation

In the first place, there are exhibited by these nuthatches several clines, an understanding of which aids materially in racial differentiation. These are in size, proportions of bill, color of under parts, and general shade of upper parts. Generally speaking, there is a darkening of coloration of upper parts in progressing toward the Rocky Mountains from both coasts. Progressing from north to south there is also a deepening of coloration. This is extended to the under parts in Mexico, where specimens assume a brownish wash on the breast. The peak of intensity in coloration is reached on the high tableland of central Mexico. Southward from that point there is a slight paling again. The palest-backed populations are in the northeastern and Pacific coastal sections of the country. The latter birds, however, tend to have a little more of the brownish wash below than other North American populations, thus showing a reappearance of the character that reaches its maximum expression in Mexico.

The clines pertaining to size are less consistent than those of color. In the east there is a fairly even progressive change in going from

larger size in the north to smaller dimensions in the south. In the west, however, the trend is just the reverse and is complicated by a superimposed west-east trend of increasing size. As is the case with intensity of coloration, the maximum wing size is reached on the tableland of central Mexico. There is a rapid decrease in this character in progressing both southward and northeastward. Northwestward, however, the decrease is much more gradual.

Variation in bill length is not correlated with wing length. The longest culmens are found among populations of the desert mountains of Nevada and eastern California, giving these birds an extremely slender-billed appearance. All populations west of the Rocky Mountains are relatively slender-billed. In this character there is a definite cline progressing eastward toward the Atlantic coast, in which region the stoutest-billed populations are to be found. Going southward in Mexico the trend is also toward stouter bills.

Other than these mentioned, all characters, some of which have been mentioned in separating races, such as upward curve of bill, size and position of white and black areas in wing and tail, breadth of tail feathers, and the like, are highly variable individually but have no geographical significance. They would seem, therefore, to have no value as racial characters.

RACES

On the basis of various combinations of the above-mentioned geographically variable characters, the following easily recognizable races may be defined:

SITTA CAROLINENSIS ACULEATA Cassin. Slender-billed Nuthatch.

Sitta aculeata CASSIN (1857, p. 254); California [= Monterey; see Grinnell (1932, p. 290)].

SUBSPECIFIC CHARACTERS.—A relatively small, pale-backed nuthatch with a relatively slender bill and a slight brownish wash below, which is more pronounced in females. Compared with *tenuissima*, the only other race with which it comes in contact, *aculeata* is smaller and paler above, less purely white (more brownish) below, with a lighter shade of chestnut on thighs and under tail-coverts.

MEASUREMENTS.—Adult male (20 specimens from western California and Oregon): wing, 83–87.5 (84.8) mm.; exposed culmen, 16–19 (17.8). Adult female (10 specimens from western California, Oregon, and Washington): wing, 80.5–86 (83.75); exposed culmen, 16–18 (17.05).

DISTRIBUTION.—Permanent resident in oak and pine woodlands, Upper Sonoran and Transition Life Zones, west of the Cascade and

Sierra Nevada ranges (exclusive of the more humid coastal strip of Oregon and Washington), from Puget Sound south to the Tehachapi Mountains in southwestern California. Specimens from Tejon Pass in these mountains are intermediate between *aculeata* and *tenuissima*. A specimen from southern Nevada, considered by van Rossem (1936, p. 37) to be a migrant of *aculeata*, seems to me to be closer to *tenuissima*.

The locality written on the type specimen of *Sitta carolinensis aculeata* is merely "California." Since there are two subspecies of the White-breasted Nuthatch in California, it has been necessary to further restrict the type locality of *aculeata*. Grinnell (1932, p. 290) suggests for such a restricted type locality—I believe rightly—the vicinity of Monterey, California, a region in which William Gambel (1848, p. 47), the collector of the type specimen of *aculeata*, was known to have collected birds. Specimens taken in regions surrounding Monterey were compared by me directly with the type and found to be indistinguishable from it. Therefore, in every way, this seems to be a satisfactory choice for a restricted type locality.

SITTA CAROLINENSIS TENUISSIMA *Grinnell.* Inyo Nuthatch.

Sitta carolinensis tenuissima GRINNELL (1918, p. 88); Hanaupah Canyon, 8700 feet altitude, Panamint Mountains, Inyo County, California.

Sitta carolinensis alexandrae GRINNELL (1926, p. 405); near Arroyo La Encantada, 7200 feet altitude, 3 miles north of La Grulla, Sierra San Pedro Martir, Lower California, Mexico.

SUBSPECIFIC CHARACTERS.—A relatively long-winged and long, slender-billed, dark-backed and whitish-breasted race. Compared with *aculeata*, *tenuissima* is long of wing and bill, has much purer white under parts, darker back, and darker chestnut thighs and under tail-coverts. In contrast to *nelsoni* it has a relatively longer and a more slender bill and more whitish under parts, with flanks less washed with gray.

MEASUREMENTS.—Adult male (22 specimens from central-eastern California and western and southern Nevada): wing, 88–94 (90.5) mm.; exposed culmen, 19–22.5 (20.9). Adult female (14 specimens from central-eastern California and central-western and southern Nevada): wing, 87–93 (88.95); exposed culmen, 18.5–23.5 (19.8).

DISTRIBUTION.—Chiefly in the pine forests of the Western Mountain Transition Life Zone, but to a lesser degree in the Spruce-Fir Subalpine Forests of the Canadian Life Zone, and the Piñon-Juniper Woodlands of the Upper Sonoran Life Zone; from south-central British Columbia

southward, east of the Cascade and Sierra Nevada ranges to northern Lower California, eastward to southeastern and southeast-central Nevada, and the western slopes of the Rocky Mountains in extreme western Wyoming and Montana.

Four topotypes of *Sitta carolinensis alexandrae* from the San Pedro Martir Mountains, and three specimens from slightly farther north in the Hanson Laguna Mountains of northern Lower California, examined in the present study, are slightly darker than specimens of typical *tenuissima* from the White Mountains of California, but in size, proportions of bill, and other characters they are indistinguishable. As for the alleged characters of broad rectrices and greater amount of white on wing and tail feathers, I fail to detect any difference in these respects among these and numerous other populations, all of which show great individual variation in these characters. Grinnell (1926, p. 409), himself, noted the similarity between *alexandrae* and *tenuissima,* but was impressed by what he considered too great a gap in their ranges for them to be genetically related. Indeed, he considered that they were further separated by a third race intervening in southern California. However, a series of specimens from San Diego County, California, seems to the present writer definitely nearer *tenuissima* than *aculeata,* the race to which birds from this region previously have been referred by Grinnell (1928, p. 219) and others. Thus the genetic gap between *tenuissima* and the northern Lower California populations is not so great as it was formerly thought to be. Southwestern California specimens, although intermediate, are darker above and paler below than *aculeata,* and are distinctly larger; seven males from Laguna in San Diego County average 88.1 mm. in wing measurements, and 19.1 mm. in exposed culmen. It would seem best to interpret the slightly darker coloration of the northern Lower California birds as a condition of intermediacy, unworthy of a distinct name, between *tenuissima* and the smaller and darker *lagunae* inhabiting the southern end of the peninsula of Lower California.

From southern Oregon northward, specimens of *Sitta carolinensis tenuissima* tend to become smaller. Culmination in this trend is reached in populations in central-northern Washington, where White-breasted Nuthatches, although indistinguishable in color and measurement from typical *tenuissima,* are about three per cent shorter of wing and eight per cent shorter of bill. In size these are about midway between *tenuissima* and *aculeata,* which probably accounts for the conclusion of Bowles (1911, p. 177) that these birds should be referred to the small coastal race. These specimens are certainly

far removed from *nelsoni* in both size and proportion, and on the basis of average characters are closest to *tenuissima*. The fact that the difference is merely one of size, which in itself is intermediate between that of two well-marked races, militates against recognition of the population as a distinct subspecies, even though the area populated by birds showing this variation is a relatively large one. An added deterrent is the fact that specimens from western Wyoming and western Montana seem to be quite indistinguishable from *tenuissima*.

The range of *tenuissima*, as here delineated, is vastly more extensive than ever previously described, and greatly changes the concept of that race as set forth by Grinnell (1918, p. 88) and Miller (1941, p. 266).

SITTA CAROLINENSIS NELSONI Mearns. Rocky Mountain Nuthatch.

Sitta carolinensis nelsoni MEARNS (1902, p. 923); Huachuca Mountains, Arizona.

Sitta carolinensis uintaensis TWOMEY (1942, p. 422); Green Lake, 40 miles north of Vernal, Uinta Mountains (altitude 8,000 feet), Utah.

SUBSPECIFIC CHARACTERS.—A relatively large, dark-backed nuthatch with bill of medium stoutness. Compared with *tenuissima* the bill is relatively shorter and stouter and the under parts, particularly in the female, are darker. In contrast to *cookei*, its nearest neighbor to the east, *nelsoni* is much darker and less contrastingly marked with black and gray on the wing feathers; also, the shape of its bill is more slender.

MEASUREMENTS.—Adult male (23 specimens from Arizona and New Mexico): wing, 89.5–94 (91.4) mm.; exposed culmen, 17.5–21 (19.0). Adult female (16 specimens from Arizona and New Mexico): wing, 86–93.5 (89.8); exposed culmen, 17–19.5 (18.4).

DISTRIBUTION.—Chiefly in the Rocky Mountain Montane Forest of the Transition Life Zone, but to a lesser degree in the Piñon-Juniper Association of the Upper Sonoran Life Zone and the Rocky Mountain Subalpine Forest of the Canadian Life Zone, from southeastern and west-central Montana south to central-northern Sonora and the Davis and Guadaloupe Mountains in central-western Texas. Westward this race intergrades with *tenuissima* in western Montana, western Wyoming, northern Utah, and eastern Nevada. It breeds eastward to the limits of the montane forest in the foothills of the rockies and wanders farther east in winter to northwestern Oklahoma and southwestern Kansas.

As pointed out by van Rossem (1936, p. 37), it also apparently wanders into the mountains of southern Nevada. The extension of the breeding range of *nelsoni* into extreme eastern Nevada is entirely

on the authority of Linsdale (1936, p. 89), who based his conclusions on specimens which I have not personally examined. Actual geographical intergradation with *cookei* to the east has not been evidenced by specimens in the present study. Presumably, however, this does take place in the Aspen Parkland region of the Prairie Provinces in Canada. Field identified records from Alberta that may possibly be referable to this race are: one observed by Preble (1908, p. 484) in the autumn of 1903, near Swift Current Rapid; and one noted by Soper (1918, p. 148) in 1906, at Edmonton.

The type series of *Sitta carolinensis uintaensis,* described by Twomey (1942, p. 422) from the Uinta Mountains, Utah, was examined in the present study, and, although somewhat more whitish on the under parts than typical *nelsoni,* indicating a tendency toward intergradation with *tenuissima,* the specimens are in other respects identical with *nelsoni,* to which race they are here referred.

SITTA CAROLINENSIS LAGUNAE Brewster. San Lucas Nuthatch.

Sitta carolinensis lagunae BREWSTER (1891, p. 149); Sierra de la Laguna, Lower California, Mexico.

SUBSPECIFIC CHARACTERS.—A relatively small, dark-colored nuthatch with a slender bill. From its nearest neighbor to the north, *tenuissima,* it is distinguished by smaller size and darker coloration above and below. From all the other Mexican races it can be separated by virtue of its relatively slender bill. From all of these, except *oberholseri* and *kinneari,* it is distinguishable also on the basis of smaller size.

MEASUREMENTS.—Adult male (5 specimens from the Victoria Mountains, Lower California): wing, 86.5–88 (87.1) mm.; exposed culmen, 18–19 (18.5). Adult female (6 specimens from the Victoria Mountains, Lower California): wing, 84–86 (84.9); exposed culmen, 17–18 (17.7).

DISTRIBUTION.—Confined, as far as we know, to the southern tip of the peninsula of Lower California, where it dwells in the pine forests of the Victoria Mountains. A single immature male in the Biological Survey collection from San Jose Island, somewhat farther north in the Gulf of California, probably was a wanderer from the higher mountainous country of the peninsula proper.

SITTA CAROLINENSIS UMBROSA van Rossem. Sierra Madre Nuthatch.

Sitta carolinensis umbrosa VAN ROSSEM (1939, p. 4); Sierra Madre, near Guadalupe y Calvo, southern Chihuahua, Mexico.

SUBSPECIFIC CHARACTERS.—The largest and darkest above of all White-breasted Nuthatches. It is larger and much darker, particularly below, than *nelsoni,* and larger and darker above than *mexicana.*

MEASUREMENTS.—Adult male (9 specimens from Chihuahua, Tepic, Durango, and Zacatecas, Mexico): wing, 89–96 (92.9) mm.; exposed culmen, 16–19 (17.5). Adult female (5 specimens from Chihuahua, Tepic, Durango, and Zacatecas, Mexico): wing, 90–91.5 (90.6); exposed culmen, 15–18 (16.5).

DISTRIBUTION.—The Transition Life Zone pine forests of the high Sierra Madre Plateau of northwestern Mexico from central Sonora and northwestern Chihuahua south to northern Jalisco and central Zacatecas.

SITTA CAROLINENSIS OBERHOLSERI Brandt. Chisos Nuthatch.

Sitta carolinensis oberholseri BRANDT (1938, p. 269); Boot Canyon, altitude 7,000 feet, Chisos Mountains, Brewster County, Texas.

SUBSPECIFIC CHARACTERS.—A medium-sized, dark-backed nuthatch. Below, *oberholseri* is somewhat darker than *nelsoni*, particularly in the shade of the brownish coloration on the posterior under parts of the female, and with a much more whitish and grayish (less brownish) cast to the entire under parts than either *mexicana* or *umbrosa*. Above, *oberholseri* is darker than *nelsoni*, particularly the female, which sex is more purely gray, less brownish or olivaceous, than either *mexicana* or *umbrosa*. From *umbrosa* it differs further in averaging smaller. The size difference of *oberholseri* from *mexicana* and *nelsoni* is less distinct and of little value in identifying specimens.

MEASUREMENTS.—Adult male (6 specimens from the Chisos Mountains, Brewster County, Texas): wing, 86–92 (88.8) mm.; exposed culmen, 17.5–19 (18.2). Adult female (3 specimens from the Chisos Mountains, Brewster County, Texas): wing, 83.5–87 (85.5); exposed culmen, 17–17.5 (17.3).

DISTRIBUTION.—The Pine communities of the Transition Life Zone and the oaks of the Upper Sonoran Life Zone in the Chisos Mountains of central-western Texas, south through the mountains of Coahuila, Mexico, to the Sierra Guadalupe in the southeastern part of that state.

SITTA CAROLINENSIS MEXICANA Nelson and Palmer. Mexican Nuthatch.

Sitta carolinensis mexicana NELSON AND PALMER (1894, p. 45); Mount Orizaba, Puebla, Mexico.

SUBSPECIFIC CHARACTERS.—A medium-sized, relatively stout-billed nuthatch, dark above and below. It is smaller and somewhat paler above than *umbrosa*, darker and more brownish below, and more brownish above than *oberholseri*, and darker and larger than *kinneari*.

MEASUREMENTS.—Adult male (9 specimens from Hidalgo, Puebla, and Jalisco, Mexico): wing, 87.5–93.5 (90.3) mm.; exposed culmen, 15.5–17.5 (16.6). Adult female (2 specimens from Jalisco, Mexico): wing, 86–89 (87.5); exposed culmen, 15.5.

DISTRIBUTION.—Chiefly in the predominantly pine montane forest of the Transition Life Zone in the mountains of eastern and southern Mexico, from central-western Tamaulipas and extreme southeastern Coahuila (Sierra Encarnacion), south to central-eastern Puebla and Morelos, and westward (south of central Zacatecas and northern Jalisco) to central-western Jalisco.

SITTA CAROLINENSIS KINNEARI van Rossem.
Southern White-breasted Nuthatch

Sitta carolinensis kinneari VAN ROSSEM (1939, p. 3); Amula (Tixtla), Guerrero, Mexico.

SUBSPECIFIC CHARACTERS.—A small, pale-backed, dark-breasted nuthatch, with about the same length of wing as *aculeata,* but with much shorter and stouter bill than that race. From its nearest neighbor, *mexicana,* it differs in being smaller and paler above.

MEASUREMENTS [adopted from van Rossem (1939, p. 4) since my own series was insufficient].—Adult male (9 specimens): wing, 82–88 (84) mm.; exposed culmen, 14.6–16 (15.3). Adult female (5 specimens): wing, 82–84 (83); exposed culmen, 14.7–15 (14.8).

DISTRIBUTION.—Chiefly in the predominantly oak forest of the Upper Sonoran Life Zone in the mountains of extreme southern Mexico in the states of Guerrero and Oaxaca.

SITTA CAROLINENSIS COOKEI Oberholser.
Eastern White-breasted Nuthatch

Sitta carolinensis cookei OBERHOLSER (1917, p. 182); Washington, D. C.

SUBSPECIFIC CHARACTERS.—A medium-sized, stout-billed, light-colored nuthatch with the palest back of any race. The lightness of the inner secondaries causes the more intense black pattern to stand out in sharp contrast as compared to western and Mexican races.

MEASUREMENTS.—Adult male (22 specimens from northeastern United States): wing, 87–93.5 (90.0) mm. (a specimen with a wing of 97 mm. was excluded from the measurements as being out of all proportion to other specimens); exposed culmen, 16.5–19.5 (18) mm. Adult female (20 specimens from northeastern United States): wing, 86–92.5 (88.25); exposed culmen, 16.5–19 (17.5) mm.

DISTRIBUTION.—Chiefly in climax and subclimax deciduous forest communities of eastern North America in the Upper Austral and Transition Life Zones; north to Prince Edward Island, northern Maine, southwestern Quebec, southeastern Ontario, northern Michigan, central Minnesota, and south-central Manitoba; west to the western edge of the Deciduous Forest Biome on the Great Plains from central Texas to central North Dakota, and possibly farther west in the Aspen Parkland corridor, where it probably intergrades with *nelsoni* in the vicinity of the eastern foothills of the Rocky Mountains. As pointed out by Oberholser (1917, p. 184) and Wetmore (1940, p. 547; and 1941, p. 505), *cookei* intergrades with *carolinensis* over a rather broad area in North Carolina, Kentucky, southern Missouri, Arkansas, and eastern Texas.

SITTA CAROLINENSIS CAROLINENSIS Latham. White-breasted Nuthatch

[*Sitta*] *carolinensis* LATHAM (1790, p. 262); America, Jamaica [= mouth of Savannah River in South Carolina (see Oberholser, 1917, p. 183)].

Sitta carolinensis atkinsi SCOTT (1890, p. 118); Tarpon Springs, Florida.

Sitta atkinsi litorea MAYNARD (1916, p. 5); New River, North Carolina.

SUBSPECIFIC CHARACTERS.—Smaller and darker above than its nearest neighbor, *cookei*. Differs from all western races by the relatively stout bill and contrastingly black and gray pattern of the wing. From all Mexican races it may be easily distinguished by the light breast, not washed with brown.

MEASUREMENTS.—Adult male (19 specimens from southeastern United States): wing, 83.5–90 (87) mm.; exposed culmen, 16–19 (17.4). Adult female (11 specimens from southeastern United States): wing, 82–87.5 (85.6); exposed culmen, 15.5–18 (17).

DISTRIBUTION.—Chiefly in the southeastern pine region of the Lower Austral Life Zone, although extending into the Eastern Deciduous Forest Biome in the Mississippi Valley region, from midway on the peninsula of Florida and the Gulf Coast to southeastern Louisiana, north to North Carolina, Tennessee, and southern Missouri, where it intergrades with *cookei* over a broad area.

Oberholser (1917: 183) seems to have been the first investigator to apply correctly the name *Sitta carolinensis* Latham with respect to the division of populations into northeastern and southeastern subspecies. Present investigations show that southern South Carolina specimens, on which *Sitta carolinensis* was based, are indistinguishable

subspecifically from peninsular Florida birds, which were the basis for *Sitta carolinensis atkinsi* Scott. On the other hand, the South Carolina and Florida nuthatches together are easily distinguishable from specimens taken at Washington, D. C., and northward, on which *Sitta carolinensis cookei* Oberholser was based. Although the type of

TEXT-FIGURE 1.—Distribution of races of *Sitta carolinensis* with indications of the trends in the variations of the major characters.

Note.—The boundary lines on this map are designed to show the limits of certain combinations of racial characters and should not be confused with the limits of occurrence of White-breasted Nuthatches. There are large areas included within the boundaries of some of the races where no nuthatches occur at all, or if they do, it is in relatively small isolated islands of favorable habitat. This is particularly true of the regions in which forest communities intergrade with grassland or sagebrush.

Sitta atkinsi litorea Maynard has not been seen in the present study, both its measurements and locality of collection fall within the limits of *carolinensis* as herein worked out.

It should be pointed out here that Bangs (1930: 353) came to the opposite conclusion, and the American Ornithologists' Union Committee on Nomenclature (1931: 237) apparently was guided by his opinion, since in the latest edition of the Check-List, *carolinensis* continued to appear as the name for the northern race, and *atkinsi* for

the southern. Strangely enough, however, the range of *atkinsi* was extended far beyond peninsular Florida, as defined by Bangs, thus automatically destroying any strength that his proposal might have had.

Wetmore (1939: 210) and (1941: 505) has recognized the true racial alignment of the northern and southern populations by placing the area of intergradation well to the north of southern South Carolina, even though by retaining the names used in the Check-List he failed to indicate the facts nomenclaturally. It seems perfectly obvious then that, unless careful study based on more adequate material than is at present housed in the U. S. National Museum collections shows that Bangs was correct in his conclusions, the name *carolinensis* must be used for the southeastern White-breasted Nuthatch and *cookei* for the northeastern form.

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Fish and Wildlife Service
Washington, D. C.

CHIMNEY SWIFT'S WINTER HOME DISCOVERED

BY FREDERICK C. LINCOLN

AMONG the few unsolved distribution mysteries regarding North American birds, probably none has excited such widespread interest as the winter range of the Chimney Swift (*Chaetura pelagica*). Although abundant throughout most of its breeding range, its disappearance during the winter season has been so nearly complete that even serious-minded Elliott Coues was inclined to give some credence to the hibernation belief of the Middle Ages ('Birds of the Colorado Valley': 377, 1878). The fall concentrations of these birds, that are noted each year in the southeastern part of the country, are truly

enormous, and flocks numbering many thousands have been frequently observed going to roost in a single chimney. The exodus from this region usually is sudden and, as is well known, records from any points south of the United States are conspicuous by their scarcity.

The phraseology used in the 1931 Check-List, in describing the range of this species south of the United States, is somewhat misleading, as "common spring transient in Haiti and reported from Mexico and Central America" implies a numerical status in the areas cited that does not agree with the facts as reported. Wetmore and Swales ('Birds of Haiti and the Dominican Republic': 260–261, 1931) summarize the few actual records for the island of Hispaniola, which include a specimen taken by W. L. Abbott on Tortue Island, May 18, 1917. Among these data, the largest number of birds reported is in an observation by Wetmore who, in the early morning of April 15, 1927, "noted a flock of forty or fifty circling over his camp on La Selle at an altitude of 1,900 meters . . ." During the next two weeks he observed others at Hinche, Haiti, and near Comendador, D. R. The species also has been observed by one or two other travelers in Haiti (*op. cit.*).

Trace the bird south on the mainland and it is found that very few records are available. The files on geographic distribution of the Fish and Wildlife Service contain the following records for this region:

MEXICO

Rancho Rinconada, southwestern Tamaulipas; a male, collected on April 15, and a female on April 27, 1941, were both taken from flocks of "small dark swifts" (Sutton and Pettingill, Auk, 59: 17, 1942).

Nuevo Leon; exact locality unknown but a specimen recorded in the catalogue of the Thayer Collection was listed as taken on April 24, 1911.

Tamazunchale and Matlapa, San Luis Potosi; a male and a female taken on April 18 and 23 (Sutton and Burleigh, Wilson Bull., 52: 225, 1940).

Pueblo Viejo, Vera Cruz; one was taken on April 5, 1902, by Brenninger and identified by E. W. Nelson. A supplementary note by the collector is to the effect that swifts were "crossing the lagoon all day, going north."

Presidio, Vera Cruz; a specimen was taken on May 6, 1925 (Bangs and Peters, Bull. Mus. Comp. Zoöl., 67: 474, 1927).

Cozumel Island; Quintana Roo; Griscom (Am. Mus. Novitates, no. 236: 9, 1926) records several swifts that he believed were this species during the periods February 5–7 and 14–27, 1926, adding the

statement that it had been collected at this point. This latter reference is probably to specimens in the British Museum (Hartert, Cat. Birds Brit. Mus., 16: 480, 1892).

Rio Givicia, Oaxaca; a female was collected on March 21, 1906, by J. H. Batty (Chapman, Auk, 48: 120, 1931).

GUATEMALA

The only record for Guatemala is a rather dubious one based upon a skin found in the collection of Lord Tweeddale without any further data and listed by Salvin and Godman ('Biologica Centrali-Americana,' 2: 374, 1893). It is not recognized by Griscom ('Distribution of Bird-Life in Guatemala,' 1932).

BRITISH HONDURAS

According to a letter from P. A. Taverner under date of April 14, 1913, a specimen was "said to have been taken" in March, 1905. It was identified as this species by Morton E. Peck but was subsequently destroyed by accident. This record is included for what it may be worth.

NICARAGUA

Two females were taken at Eden on April 1, 1922 (Huber, Proc. Acad. Nat. Sci. Phila., 84: 218, 1932).

COSTA RICA

On October 24, 1933, at Vitla Quesada in the District of San Carlos at an altitude of 2100 feet, a flock of more than 50 was seen and specimens were obtained (Smith, Oologist, 51: 100, 1934).

PANAMA

As a result of more extensive ornithological work in Panama, a larger series of records is available for this country than any other in Central America. All, however, are of comparatively recent date.

The first specimen was obtained on October 23, 1926, on the Changuinola River in the Almirante Bay region and recorded by Peters (Bull. Mus. Comp. Zool., 71: 314, 1931).

A year later, on October 28, two others were taken at Cocoplum, Boca del Toro and recorded by Chapman (Auk, 48: 119–121, 1931).

To these fall records, Rogers (Auk, 54: 392, 1937, and 56: 82, 1939) adds data for four collected in the spring by H. Wedel and preserved in the collections of the Princeton Museum of Zoology. The first two (questionably sexed as a pair) were taken on April 24 and 25, 1934, at Port Obaldia on the Caribbean coast of extreme eastern

Panama, while the other two (both males) were taken on April 12 and May 14, 1937, respectively, on the Cricamola, about sixteen miles south of its mouth.

Added to this specimen evidence is the observation of Chapman (Auk, 54: 392, 1937) who "saw a loose flock of about forty swifts resembling *Chaetura pelagica*" on April 18, 1937, "about two and a half hours out of Cristobal and ten miles north of the Panama mainland near Porto Bello. Captain Swinson of the S. S. 'Ancon,' who was with him at the time, subsequently told him that about half an hour later he saw another flock of about one hundred of "those cut-wing birds."

At Panama the trail has ended, the southernmost records being the 1934 Rogers specimens (*loc. cit.*) which were obtained near the Colombian boundary.

The probable location of the winter range very naturally has been the subject of much conjecture, the general concensus being that it was somewhere in the vast valley of the Amazon River. The first confirmation of this hypothesis is the recent observation by E. Thomas Gilliard (Auk, 61: 134–144, 1944). He reports that at dusk on March 28, 29, and 30, 1943, he observed "a cloud of thousands of swifts, resembling in every detail our North American Chimney Swift (*Chaetura pelagica*) was seen hanging over a large abandoned, red chimney in the town of Manaus, situated on the Rio Negro about a thousand miles up the Amazon valley." While no specimens were obtained, the whole incident is so typical of Chimney Swifts that there seems little reason to doubt the identification, particularly in view of the following banding data now at hand:

During the past ten years the large-scale banding of Chimney Swifts has been a popular activity at several stations. From southern Canada to points adjacent to the Gulf Coast, these birds have been taken in large numbers during both spring and fall migrations. The total number that have been banded is nearly 375,000 and hundreds of birds banded at some stations have been retaken at others. In fact, data now available will make possible a detailed study of the migration of the swift in North America.

A constant hope has been that the band from one of these birds would be reported from its winter range, but to receive 13 in a single communication was beyond wildest expectations. The report comes from the American Embassy at Lima, Peru, which through the State Department, returned the 13 bands recovered "from some swallows killed by Indians on the River Yanayaco in the region between the

Points of Banding and of Recovery in Peru of Thirteen Chimney Swifts

Putumayo and the Napo Rivers." Under date of May 23, 1944, the report states that the birds were taken "some six months ago" which would mean the last of November or the first part of December, 1943. The banding data for this series are as follows:

Band No.	*Locality of Banding*	*Date*	*Bander*
38-87399	Ont., Kingston	5/19/40	R. W. Smith
38-169645	Ga., Macon	9/17/39	R. J. Fleetwood
37-108787	Ala., Opelika	10/ 3/36	H. S. Peters
139-36718	Conn., New Haven	5/24/40	H. L. Hutchins
239-12620	Ill., Lake Forest	8/ 8/39	P. E. Downing
39-71442	Tenn., Nashville	8/31/38	J. B. Calhoun
39-83055	Tenn., Nashville	9/ 5/38	J. B. Calhoun
38-21419	Tenn., Memphis	10/ 4/37	B. B. Coffey, Jr.
39-95532	Tenn., Memphis	9/21/38	B. B. Coffey, Jr.
39-96804	Tenn., Memphis	9/21/38	B. B. Coffey, Jr.
40-82881	Tenn., Memphis	10/13/40	B. B. Coffey, Jr.
40-57724	Tenn., Memphis	10/ 8/39	B. B. Coffey, Jr.
140-44267	Tenn., Nashville	10/13/40	Mrs. F. C. Laskey

According to the latest map available to me (Nat. Geog. Soc., Oct., 1942), the Putumayo River, except at its lowest end, forms the boundary between Peru and Colombia. It is a tributary of the Solimoes, the largest southern branch of the Amazon. The Napo follows a roughly parallel course through northern Peru about 100 miles to the southwest and the Yanayaco is apparently one of two small unnamed (on my maps) streams, both tributary to the Napo and entirely in Peru. This region is roughly one thousand miles air-line west of Manaus, Brazil, the site of the observations by Mr. Gilliard (See map).[1]

Fish and Wildlife Service
Washington, D. C.

A SURVEY OF THE PRAIRIE FALCON IN COLORADO

BY HAROLD WEBSTER, JR.

Plate 27

THE Prairie Falcon (*Falco mexicanus*) ranges throughout Colorado, showing a marked preference for the lower foothills wherein to nest and raise its young. Some rather warm-blooded individuals have been recorded in this state nesting as high as 10,000 feet, but I am sure

[1] The Yanayacu, as it is shown on Peruvian maps, is an affluent of the Napo from the north, emptying into the larger river about 75 miles from its mouth and some 40 miles due north from Iquitos. It is a little west of the point shown on Mr. Lincoln's map.—ED.

such an occurrence is rare indeed. It is uncommon to see wandering individuals as high as 11,000 or 12,000 feet during the summer months.

When choosing a suitable nesting site, these noble birds make sure of ample open ground over which to hunt. Those individuals that nest deep in the mountains make their homes in the tall cliffs overlooking wide mountain valleys or on the sides of the many mesas or table-mountains covering southern and western Colorado. They nest without fail on tall, inaccessible bluffs or escarpments, usually choosing a ledge overhung by large sections of rock, making observations rather difficult for the curious ornithologist. These cliffs range from 30 to 300 feet high, and many of them can be reached only with a stout rope and plenty of stamina. There are other eyries situated on cliffs of the Colorado River Canyon whose sides tower more than 1,500 feet and, at present, are in no immediate fear of disturbance by curious humans.

I have recently estimated the total nesting population of the Prairie Falcon in Colorado as comprising, conservatively, 500 nesting pairs. I have visited 135 eyries in the last five or six years and have centered my rather limited 'birding' in three small sections of the state. The southern section centers about Colorado Springs and El Paso County, the middle section about Denver and the adjoining towns, and the northern section in the chalk cliffs along the Colorado-Wyoming boundary line. Mr. Floyd Ballanger of Palmer Lake, Colorado, has told me of at least eighty pairs of nesting Prairie Falcons which I have never visited. It is safe to say that every cliff conveniently situated near good hunting ground will have a pair of these desert falcons. In some rather densely populated sections it is not unusual to find two pairs nesting within three or four hundred yards of each other, and in one instance we counted twenty-three pairs in sixteen miles of cliff, making the most heavily populated breeding ground of this falcon known today.

I have been asked many times about the possibility of nesting Duck Hawks in Colorado. All of the recorded eyries previously inhabited by the Duck Hawks are now occupied by the Prairie Falcon and not deserted as one might suspect. Several competent ornithologists have seen both the young and the adult Duck Hawks in June and July, but no signs of any eyrie have been found despite great efforts. It is difficult, indeed, to find the eyrie of any bird in some of the very deep gorges which could easily hide a dozen birds without the possibility of detection. It can be surmised that the Duck Hawk has been crowded out by the Prairie Falcon as a resident breeding

bird. It is not at all uncommon to see twenty or thirty Duck Hawks during the fall and spring migrations in Colorado, but they disappear during the breeding season.

A great deal has been said in recent years by conservation officials concerning the possibility of extinction of the Prairie Falcon. I honestly think that this falcon is holding its own despite a very noticeable decrease in all other species of birds of prey, especially the Buteos. No eyrie known to me has remained over one season without occupants. In many cases, each pair of nesting falcons may have two or sometimes three nesting ledges which they use in alternate years, but all of them are within a comparatively short distance from one another. Many times one of the adult birds will be shot or fall victim to some tragedy, but it is soon replaced by another bird. If the pair is broken up early in the nesting cycle, the replacement of a mate is soon forthcoming, but if a pair is broken up late in the year, it is usually not until the following year that the pair is again complete.

Apparently, Prairie Falcons start nesting before they are a year old, since we have noticed certain mated birds which have not as yet acquired certain adult characteristics—namely, the yellow cere and feet. I have yet to see a juvenile male about the ledge as one of a mated pair, but it is a known fact that juvenile females are capable of raising and do raise, a healthy family.

We are very uncertain about the migration of the members of the falcon family; some authorities give proof of an east-west migration while others maintain that a north-south route is followed. I believe, however, that there is little or no migration by our local falcons, although the birds that live deep in the mountains come down to the prairie to winter. One beautiful immature female which I trained in falconry was lost late in October, 1938, at Denver, Colorado (alt. 5,280 feet) and was shot several days after Christmas of the same year at an altitude of over 9,000 feet in one of our large mountain valleys. No doubt she had found the wintering ground of a rather large group of birds and had successfully thrived on them up until the time that she met her unfortunate end. I have never seen Prairie Falcons this high during the winter months since the snow and bad weather usually drive out all bird life, making existence rather difficult for a bird noted for feeding on the fat of the land.

Another interesting feature of the migration of the Prairie Falcon on which I am trying to get more information is the presence of very dark individuals that might possibly belong to a separable subspecies. These individuals are easily told from the local birds in the field by

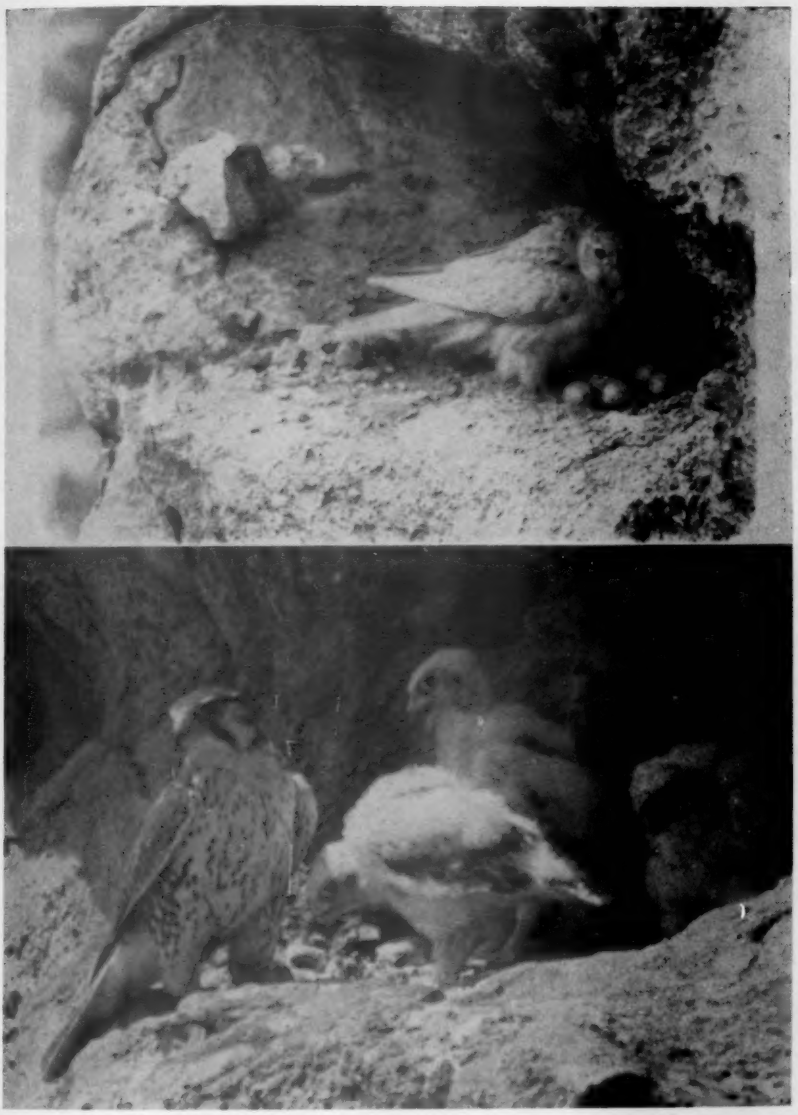
very dark chest markings such as are usually seen only on the immature Peregrine Falcons. They have a very prominent cheek marking and the back is more heavily marked, making the birds almost impossible to distinguish from young Duck Hawks. I suspect that these birds are of more northern origin because of their appearance only during the migrations of fall and spring.

Certain pairs of local falcons can be seen at almost any time of the year within a short distance of their eyries. I have tried to show by the use of colored leg bands which birds remain close to the eyries during the winter months and which do the wandering, but observations have revealed almost nothing. However, certain individual birds with noticeable characteristics, such as missing and discolored feathers or peculiar styles of flight, have helped greatly in identifying local wintering falcons.

I have found that the adult male is first to arrive at the nesting site in early spring. He usually precedes the female by a week or ten days, but, when one of the pair that nested there the previous year has been killed, there is usually a lapse of two weeks or more before a complete pair is in occupation of the nesting ledge. In the southern and middle sections of the state, a complete pair is at the cliff on or before the 15th of March and often a little earlier, depending greatly on the weather. If the winter has been mild, the birds will be at the ledge three or four weeks ahead of schedule, ready to begin the task of raising a brood of hungry young.

After a rather spectacular period of courtship lasting about one month, the eggs are laid on the bare cliff ledge which shows no more signs of housekeeping than a shallow hole scooped in the sand. Most ornithologists give the period of incubation as 27 to 30 days, but we have found it to be 31–33 days, although there are several instances in Weld County of a set of five eggs that was incubated for 37 days. Possibly this nest had been visited by an 'egger,' resulting in this long period.

About 95 per cent of the young birds hatched in the southern and middle sections of the state leave the eyrie safely, but in the northern section of the state only about 35 per cent of the young survive the first month. Somehow a certain tick with which I am unfamiliar has succeeded in getting a good foothold and is killing off a goodly number of the young falcons. This tick has been identified by the United States Fish and Wildlife Service as common to ground squirrels and spermophiles and here, no doubt, is the carrier of death to many young falcons. I was greatly surprised to see that, in eyrie after eyrie, the



PRAIRIE FALCON.—(*Upper figure*) AN ALBINISTIC FALCON ON THE NESTING LEDGE IN WELD COUNTY, COLORADO. (*Lower figure*) HUNGRY YOUNG WAITING TO BE FED AT THE EYRIE IN JEFFERSON COUNTY, COLORADO. (*Photographs by A. M. Bailey and Robert Niedrach.*)

young were so miserably weak that they could no longer eat, much less attempt to leave the nest after their usual stay of five weeks. Adult birds taken late in the nesting season are entirely free from the tick, but the unfortunate young are so infested that the ticks can be scraped off the nares and lores in great quantities. Very often, out of five young birds hatched in a single eyrie, only one will be able to leave well enough to take care of itself.

The greatest mortality among young falcons that successfully leave the eyrie takes place within six weeks. This has been shown by our banding records and accounted for by the fact that they have no fear of man nor gun and can be easily approached by so-called 'vermin' hunters. However, to approach the sly, old, adult falcon is, indeed, another matter.

Another rather unusual detail that we have found relative to the Prairie Falcon is a very abrupt change from a diet of rodents to one exclusively of birds about the time that the young falcons are hatched and beginning to show their ravenous appetites. On examination of the food pellets or castings, it has become a noticeable fact that can be explained only vaguely. When the rodents are mating during the spring and are most conspicuous, they fall easy victims to the falcon which, no doubt, is looking for the easiest way of getting its dinner. Later, when the young of the small birds are on the wing and rather awkward, their great numbers probably make it much easier for the falcon to provide for its young. By this time, also, the rodents are spending much less of their time in ways that make them conspicuous.

Probably the most common form of bird life preyed upon by the Prairie Falcon is the Western Meadowlark, with the Mourning Dove running a close second. The Prairie Horned Lark, Lark Bunting, Rock Pigeon, Magpie, and even the Burrowing Owl make up the remainder of the feathered menu. The thirteen-lined spermophile makes up the main portion of the rodent diet.

In comparison to a Duck Hawk, the Prairie Falcon has a much smaller appetite, eating about one-fourth to one-half as much during the course of a year. The Prairie Falcon is able to go without food for rather long periods of time and is well satisfied to feed rather heavily four or five times during the week. In falconry it is difficult to condition some of these birds because of their seeming lack of any appreciable appetite. It is true that some individuals feed on birds the year round while others are completely satisfied with a diet of rodents when and where they can be found. I think that this depends largely upon the type of country over which the falcons hunt and

on the type of animal life present. One particular eyrie in northern Colorado appears at various times to look as if someone had thrown a yellow cloak over it, due to the great abundance of meadowlark feathers about. During the winter months I have seen the falcons feeding rather exclusively upon small birds such as horned larks, blackbirds and various sparrows, with an occasional taste of waterfowl. I have in mind a particular eyrie occupied by a pair of falcons which have tasted fancy, racing, homing pigeons many times and feed almost exclusively upon the pigeons which live near-by in the rocky escarpment.

The presence of juvenile birds about the old eyries mystified us greatly. One particular eyrie west of Denver is visited every year by the juvenile birds of the previous year and, were it not for a bit of albinism in the juveniles, it would be difficult, indeed, to be sure that they were from this particular eyrie. The juvenile birds are driven away late in the courtship period after making repeated attempts to imitate the strutting and graceful flying of the adult male. These young birds can easily be told from the adults by the absence of several wing feathers, due to their molt which is several months ahead of that of the adult birds, and by the lack of color in the feet and cere. To observers who are trying to pick out the adults from the immature falcons, all flying about in a seemingly endless maze on a windy March morning, it is indeed a boon to have such characteristic differences.

I have taken a particular interest in many recent articles written on the relative speeds of various birds, and it seems strange that the Prairie Falcon is listed at a mere 60 miles per hour. I have, on occasion, seen the amazing feat of a small Prairie Falcon taking White-throated Swifts and Violet-green Swallows which are considered by most ornithologists as very fast and 'shifty.' In each instance the little male or tiercel succeeded in getting the swifts to follow it high up in the air and, after a bit of maneuvering, got a chance at the victim in a down-wind stoop. This chase was most uninteresting since it was over in the wink of an eye and did not give half the thrill that the pursuit of a fast teal or Mallard might have given on a cold December morning with the watery refuge of the duck only a short distance away. On various occasions we have seen one of these swift falcons fly into a small flock of shorebirds and come out with an unfortunate victim clutched tightly in its large, yellow foot.

Probably the most spectacular kill that I have ever witnessed took place over a tall escarpment. As we approached this particular cliff the old female falcon rose high into the air and screamed at us very

indignantly for trespassing upon her domain. She soon towered high above us and, in a long down-wind stoop, vanished from view. We were in a hurry to leave the vicinity lest we cause the brown-splotched eggs to become cold, and hastened away from the cliff, leaving the eyrie in peace. About 75 feet south of the falcon's eyrie was a small pothole in the cliff containing the nest of an old Montana Great Horned Owl which had nested near her fast-flying neighbor for more than five years. We approached her nest very cautiously and, when all were in a position to watch her leave, we flushed the old owl off the nest. The old bird headed across a small open section to seek shelter in a grove of scrub oaks about 100 yards away, but when she reached the middle of the open area she seemed to explode in midair and drop lifeless to the ground. The old falcon had come up and dealt a lightning blow that immediately put an end to the career of the owl. The apparent ease with which the falcon had dispatched the owl urged us further to examine the bird which we found quite dead and torn open as if it had been given a tap with a sharp cleaver.

Being rather interested in falconry and in the best hawking country in North America, I have had numerous letters asking about a comparison between the flying powers of the Prairie Falcon and the Duck Hawk. Each has its own mode of hunting and each is best adapted to its own particular way of obtaining food. The Prairie Falcon is much less heavily built than a Duck Hawk of the same body-length and wing-measurement. The Prairie Falcon catches its quarry while flying only about twenty to thirty feet above ground before the unfortunate victim has a chance to gain the nearest cover. The Duck Hawk, on the other hand, 'waiting on' at a tremendous height, catches its supper when the unfortunate bird is well away from the ground and carries off its kill to be eaten at leisure.

I have found the Prairie Falcon to be much more agile on the wing than the Duck Hawk, but, for speed and swiftness, the comparative lack of weight appears to keep the Prairie Falcon from attaining the tremendous velocity for which the Duck Hawk is everywhere known. With the added weight of one-sixth to one-third more for birds of equal wing- and body-lengths, the Duck Hawk is able to deliver a back-breaking blow while the Prairie Falcon often has to clutch its victim, killing it with a powerful grip instead of dispatching the victim with one clean, quick blow.

As to the temperaments of the two falcons, one of the most disagreeable features of the Prairie Falcon is a vile and unpredictable temper. One day a falcon is as calm as can be and the next day, wilder than

a hurricane. I have long since stopped trying to predict the 'nature of the day' with a Prairie Falcon and take each day in its stride. On the other hand, the gracious and lovable nature of the Duck Hawk is something to admire. Another rather unusual fact is that near the nest a Prairie Falcon lacks the boldness of the Duck Hawk which is well known for its efforts to thwart man's attempts to ruin its nest. I know of only one instance when a Prairie Falcon actually struck an intruder, but many times when they have come close enough for me to see the fire in their black eyes.

1937 Grape St.
Denver, Colorado

IN MEMORIAM—CARL EDUARD HELLMAYR

BY JOHN T. ZIMMER

Plate 28

CARL EDUARD HELLMAYR, Honorary Fellow of the American Ornithologists' Union, died in Orselina, Switzerland, on February 24, 1944. By his death, ornithology lost one of its notable figures and its most outstanding student of Neotropical birds.

Hellmayr was born on January 29, 1878, in the neighborhood of Vienna, possibly in the suburb of Mödling where some of his early papers were written. There is little on record concerning his early life, but he must have become interested in birds while still a boy, for his second publication, a 'Beiträge zur Ornithologie Nieder Österreichs,' in the Ornithologische Jahrbuch for 1899, concerns observations on local birds that were begun in 1894, when he was sixteen years old. In this paper he expresses thanks to von Tschusi zu Schmidhoffen for supplying certain papers that he needed, and it is probable that Tschusi was an early counsellor in his ornithological studies. His first paper, on '*Muscicapa parva* in Wienerwald,' appeared in the Jahrbuch in 1898.

He studied at the University of Vienna and possibly Berlin, but there is no immediately available record of his academic accomplishments. The honorary title of 'Professor' was given to him at Munich some years later when he joined the staff of the Bavarian State Museum at that place.

Hellmayr's home remained near Vienna at least until 1902 although he was not always in residence. In October, 1900, he met Count Hans von Berlepsch at the jubilee meeting of the Deutsche Ornithologische Gesellschaft in Leipzig—a meeting that bore notable fruit.

C. E. Hellmayr

PHOTOGRAPH BY COURTESY OF THE CHICAGO MUSEUM OF NATURAL HISTORY

Berlepsch was greatly interested in South American birds of which he had a fine collection, and a paper that Hellmayr presented at the meeting, dealing with the genus *Polioptila,* gave them an immediate basis of mutual interest. The close friendship that ripened between Berlepsch and Hellmayr never waned. Hellmayr valued the Count's friendship and advice above all other early influences and always expressed the warmest admiration for his kindly mentor. In his biographical sketch of Berlepsch, published after the Count's death in 1915 (Journal für Ornithologie), he said that in Berlepsch's excellent "school" he first learned method, system, and soundness in ornithological work.

Early in 1903, Hellmayr joined the staff of the Zoological Institute at Munich with the task of organizing an ornithological department in the Bavarian State Museum, of which department he became Curator. He promptly set himself to the study of the collection of Brazilian birds obtained by J. B. Spix some eighty years before, and his important 'Revision of Spix's Types of Brazilian Birds' (1905) resulted. In 1903 had appeared his first extensive systematic treatise—the monograph of the Paridae, Sittidae, and Certhiidae that forms the 18th Lieferung of 'Das Tierreich.'

In 1905, with a three-years' leave of absence, he transferred his activities temporarily to the Rothschild Museum at Tring, England, where he came under the further able guidance of Ernst Hartert. Various publications in the 'Novitates Zoologicae' and the wealth of specimens in the Rothschild Collection, now in the American Museum of Natural History, that bear his identifications on the labels, attest to the good use he made of his three years in Tring. The reports on G. A. Baer's collection of birds from Goyaz and on Hoffmanns's material from the Rio Madeira and Teffé, Brazil, are his most important contributions based on Tring material. Some equally important papers were later published in the 'Novitates Zoologicae' that were written elsewhere.

In 1908, Hellmayr returned to Munich where he remained until September, 1922. With his usual energy he applied himself to building up the ornithological collection and library and was highly successful in both projects. He became the General Secretary of the Ornithological Society of Bavaria and Editor of its 'Verhandlungen'—a post that he held until late in 1921. He further undertook the preparation of the ornithological section of the bibliographic part of Wiegmann's 'Archiv für Naturgeschichte' which he compiled from 1908 to 1915. This task alone involved a multiplicity of reviews,

abstracts, and notations of new species from world-wide sources but it did not break the flow of publications on his own investigations. Seven numbers of Wytsman's 'Genera Avium,' a report on a collection of birds from southeastern Perú, the 'Critical Notes on the types of little-known species of Neotropical birds,' a study of the birds of the region about the mouth of the Amazon, the 'Nomenclator des Vögels Bayerns' (with Alfred Laubmann), an account of the birds of the Cumbre de Valencia region of Venezuela (with Seilern), and numerous shorter papers mark this productive period.

As early as 1904, Hellmayr visited Paris for a short sojourn at the Museum d'Histoire Naturelle, returning for a longer period in the winter of 1905–1906 and on numerous occasions thereafter. One of the great results of his work in Paris was his review of the types of birds collected in South America by Alcide d'Orbigny, of which six parts appeared at intervals from 1921 to 1925. Other papers, however, are enriched by the valuable data he secured on his Parisian visits.

In 1922, Hellmayr left Europe for a long residence in America. C. B. Cory of Field Museum of Natural History, Chicago, had died, leaving his 'Catalogue of the Birds of the Americas' only begun with the issuance of one volume in two parts. In the search for an ornithologist to continue this great work, the offer was extended to Hellmayr, and results have proved that no wiser selection could have been made. By this time he had studied in all the most important museums of Europe and was familiar with their collections of birds, including all the available type specimens of Neotropical forms. Since 1900 he had had in prospect a comprehensive work on the birds of Brazil which he had never brought to completion, and he had accumulated a vast quantity of notes on synonymy and classification. In America he was to find the important collections that he had not already seen. Certainly no one else was as well prepared for the task in hand.

He reached Chicago on October 1, 1922, was given the title of Associate Curator of Birds, and immediately began on the 'Catalogue.' As volume after volume was finished and published, the importance of this monumental work became increasingly established. The bibliographic citations were at once expanded to embrace nearly all the pertinent references to each species and subspecies, omitting only such as might have been previously quoted by Ridgway in the 'Birds of North and Middle America.' The synonymies thus are so nearly complete that any prior reference that is omitted is likely to prove of only casual interest. All these citations were, or had been, checked

in person—an enormous task in itself and one of inestimable value to the research worker of today.

But it is not alone for the synonymies that the 'Catalogue' is of extreme importance. The author's familiarity with the types of almost all of the described species and subspecies of American birds enabled him to express studied opinions on the validity of proposed forms, the identity of inadequately described species, and the relationships of members of heterogeneous groups, and the footnotes of his volumes are filled with critical notes on these and other taxonomic problems. His views on classification were advanced and he was in the forefront of his colleagues in the matter of postulating conspecific relationships for geographic representatives of obviously common origins. The book is thus more than a mere catalogue and forms a practical handbook for the advanced student of American birds—a vade mecum of the highest service. Most of the work is published and it is gratifying to learn that the remaining parts were completed in manuscript form before Hellmayr's untimely death so that eventual publication is assured.

With all the labor involved in the 'Catalogue,' Hellmayr still found time for such collateral investigations as those embodied in his 'Birds of Chile,' 'Contributions to the Ornithology of Northeastern Brazil,' 'Heterogynism in Neotropical Birds,' and the 'Birds of the James Simpson-Roosevelts Asiatic Expedition.'

In July, 1931, he returned to Europe. He had spoken earlier of difficulties with regard to confiscatory taxes on European properties and had been obliged to forego American citizenship because of this economic penalty. He moved back to Vienna and obtained facilities for work at the Museum of Natural History. He was there when the Nazis invaded Austria in 1938. A few days after the local revolution had overturned the government, he was escorted to police headquarters, ostensibly for questioning, but was immediately imprisoned without explanation. The following day he fell ill and was removed to a hospital where he was incarcerated for seven weeks in a distinguished company of university professors, government officials, and others. When finally released, he was obliged to undergo further treatment at one of the university clinics. Afterward, after two months of effort and delay, and at the sacrifice of all his holdings in Austria (his property in Munich had already been confiscated), he succeeded in leaving Austria for Switzerland where he made his home until his death.

The reasons for his mistreatment are not perfectly clear. Hellmayr

was not active in politics and neither wrote nor spoke in public on such topics, but he was a man of decided views and was not in sympathy with the Nazi party. This feeling he, no doubt, had freely expressed in private conversations. There seems little doubt that some such confidential expression of opinion had been picked up by spies and reported to Nazi headquarters with unfortunate results when that party came into power.

After a short period of recuperation in the mountains, he went to London for necessary studies in the British Museum, and then returned to Geneva to continue work on the 'Catalogue,' albeit at a great disadvantage without the benefit of adequate collections or his personal notes which he was unable to have sent to Switzerland although they were in safe storage. The spread of the war began to hamper the free flow of communications and his letters became more infrequent, although still cheerful and informative. His health, however, had suffered and apparently he never regained his former vigor. In September, 1942, he went to the hospital in Coire with apprehensions of an operation, after having lost a great deal of weight in preceding months. In late 1943, he and Mrs. Hellmayr moved to Orselina, near Locarno, for the winter in the hope that the milder climate of the Tessin region would benefit him. Although he was much weakened, he continued to the last his 'labor of love' on the 'Catalogue of the Birds of the Americas,' which he was giving a final revision, but his death from the effects of uremic poisoning came unexpectedly on February 24. He is survived by his widow, Mrs. Kate Hellmayr, whose name he had given many years before to the colorful tanager, *'Calospiza gyroloides catharinae.'*

Dr. Hellmayr was a most charming associate and friend. A true cosmopolite, he knew the European scene in detail, and, of course, knew all the ornithological personages of his time and many things about them that have never found their way into print. He talked litte about himself but his conversations were full of interesting facts about a wide variety of topics. He had an exceptionally keen mind and a phenomenal memory of the noteworthy specimens of birds that he had studied and the literature of ornithology that had passed through his hands. Nevertheless, he kept concise but detailed notes on all his important studies and was able to unearth illuminating commentaries on perplexing points in almost unlimited number.

Most genial and kindly, he had little patience with careless work, though he was always ready to give assistance to a serious student or to concede a previous error. The first instalment of one of his papers

appeared with so many typographical errors that he lost interest in it and refused to complete the manuscript. He rarely spoke in public and at A. O. U. meetings was usually to be found, not in the lecture halls, but among the collections of the local museum, examining specimens or conversing with some fellow ornithologist.

In his younger days, Hellmayr was an ardent Alpinist and even in later years enjoyed vacations in the Rockies or in his beloved Alps. He was intensely interested in orchids and had a very fine herbarium collection of the terrestrial members of that group of plants which he and Mrs. Hellmayr had gathered over many years, often travelling far afield in Europe and the United States to secure certain desirable forms. His oft-expressed determination was to retire after the completion of the 'Catalogue' to devote his remaining years, entirely divorced from birds, collecting orchids and writing a history of the French Revolution in which subject also he had long been interested. As noted earlier, his first papers dealt with field work he had done as a youth, and at one time he had a strong desire to visit the American tropics to see in life some of the birds about which he knew so much as museum specimens. His eyesight, however, was better adjusted to the museum than to the field which he found eyeglasses both necessary and inconvenient for bird-watching, and he never fulfilled his hopes in that particular nor lived to concentrate on the avocations to which he had looked forward.

Hellmayr became a Corresponding Fellow of the A. O. U. in 1903 and an Honorary Fellow in 1911. In 1929, he received the Brewster Medal for his work on the 'Catalogue.' He was an Honorary Member of the British Ornithologists' Union and of the Sociedad Ornitológica de La Plata. He joined the Deutsche Ornithologische Gesellschaft in 1901 but appears to have left the society in 1908, the year he returned to Munich. No complete bibliography of his publications can be given here, but the titles number over 160, some of which, including the 'Catalogue' comprise various parts. Almost all of the papers are taxonomic studies and, with the exception of several on the birds of Arabia, Timor, and eastern Asia and the early discussions of local birds in Bavaria, almost all of them are devoted to the Neotropical region. Upwards of three hundred species and subspecies and a dozen genera of New World birds and seventeen species and subspecies and two genera of Old World birds were named by him alone or in collaboration, and the great part of his new forms have stood the test of time and critical review. They begin with *Polioptila maior*, described from Perú in 1900. Two genera and some forty-two species

and subspecies have been honored with his name by other taxonomists. The new forms which he characterized are not, of course, the truest measure of his achievements, although their number is impressive. The 'Catalogue,' forming the epitome of his life's work, is a stronger criterion, but it is only a greater and more complete structure than his other publications, all of which were, in their respective fields, prepared with the same rigorous search for fundamental truth. The monument, built with his own hands, needs no further adornment.

American Museum of Natural History
New York, N. Y.

REPORT OF THE A. O. U. COMMITTEE ON BIRD PROTECTION FOR 1943

IT is difficult for an inexperienced Committee to assemble in a few months all the information that should go into an annual report of this kind. We have therefore requested each national organization concerned with the conservation of wild life to send us a brief report of its principal activities for the year so far as they concern bird protection, in order that we may put on record a summary for the information of the membership of the American Ornithologists' Union. We have tried to secure information on the present status of endangered species and we are offering the results in Part B of this report. In conclusion, we are recommending such additional studies or protective measures as seem feasible to us to improve the present situations. We have received very courteous replies to our questions from (1) Mr. John H. Baker representing the National Audubon Society; (2) Mr. Albert M. Day and Dr. Clarence Cottam representing the U. S. Fish and Wildlife Service; (3) Mr. Hoyes Lloyd representing the Department of Mines and Resources of Canada; (4) Dr. H. L. Shantz of the U. S. Forest Service; (5) Mr. G. K. Zimmerman, Chief of the Department of Information of the U. S. Soil Conservation Service; (6) Mr. Victor Cahalane of the National Park Service; and (7) Mrs. Rosalie Edge of the Emergency Conservation Committee. The following are their reports of accomplishments for the year 1943:

PART A

(1) NATIONAL AUDUBON SOCIETY

"1. The Audubon Nature Center at Greenwich, Connecticut, has been developed through alterations of an old barn into a nature museum, with exhibits portraying the interrelationships of animals,

plants, soil and water, on the 281-acre tract, and the various types of animal and plant communities existing there. A nature trail has been laid out and marked; a new entrance road and parking space have been built. Dr. Richard Lee Weaver has been appointed Educational Director and will carry on an active nature educational program as well as supervise a conservation research program. The Center was opened to the public October 16–17, 1943.

"2. Active collaboration has continued with federal and state agencies concerned with the development of a wise land-use plan for the Everglades Region in Florida. A well qualified hydraulic engineer has now been appointed Engineer and General Manager of the Everglades Drainage District and a new Advisory Committee has been set up, on which are not only representatives of the state agencies involved, but the U. S. Soil Conservation Service, the U. S. Geological Survey, the National Park Service, and the National Audubon Society.

"3. Provision of warden service at Audubon Sanctuaries has been maintained in spite of war conditions, and new leases have been executed on four rookery keys in Florida. Short-term lease on the San Gabriel River Bird Sanctuary in California has been converted into a fifty-year lease with provision that the property may be sold only subject to encumbrance of the lease; this gives relative assurance of permanence. The crop of young birds raised in the Audubon sanctuaries in the spring of 1943 has on the whole not been as large as in the preceding year. This has apparently been due to climatic and cyclical causes. Minor depredations have occurred in a few locations where a small number of birds has been killed for food as a result of the increasing difficulties of obtaining meat, but at all such locations a large crop of young birds has been successfully raised to flying maturity.

"4. Representations made to the School Land Board in Texas resulted in the inclusion of distance and seasonal restrictions on oil drilling operations in certain leases of submerged lands adjacent to the Audubon sanctuary on the Vingtun Islands. Establishment of this principle as a precedent may be of vital importance to the successful maintenance of bird sanctuaries in coastal Texas waters and perhaps elsewhere.

"5. Initiation of the Audubon Wildlife Screen Tours program under the direction of Wayne Short, formerly of St. Louis. The initial series is sponsored by affiliated groups in ten principal mid-western cities, Columbus, Indianapolis, Cincinnati, Detroit, Chicago, Milwaukee, Minneapolis, Des Moines, Kansas City, Omaha. The initial

group of lecturers are Dr. Olin S. Pettingill, Mrs. Edna Maslowski, Mr. John H. Storer, Mr. Alexander Sprunt, Jr., Mr. C. A. Harwell. This program seems susceptible of considerable expansion in future years.

"6. The School Nature League was merged with this Society, and its activities have been carried on by the Society with the finest kind of cooperation from the Board of Education of the City of New York, which has assigned a teacher at its expense on full time to promote the establishment of nature rooms and assist teachers in the knowledge of conservation and nature appreciation teaching techniques and the use of available printed materials. This program seems to hold great potentialities through expansion and development in all principal cities of the country.

"7. The feather trade has again been checked for observance of existing federal and state plumage laws.

"8. Rationing and other restrictions seemed to make it unwise or impossible to continue during the past year operation of the Audubon Nature Camp in Maine or the Audubon Wildlife Tours in southern states and in California. The Society plans to renew these activities at the earliest feasible moment."

(2) U. S. Fish and Wildlife Service

"Four new national wildlife refuges were established in the following localities: Hernando County, Florida; Accomac County, Virginia; Kidder County, North Dakota; and Skagit County, Washington. Two refuge areas were removed from our jurisdiction: one by transfer to the National Park Service and one by General Land Office decision. The number as of June 30, 1943, was 274, totaling 17,620,320 acres. A very large proportion of the refuges were established primarily for bird protection.

"The Federal Aid in Wildlife Restoration involved coöperation with Soil Conservation Districts, particularly in developing field borders that will be of value to birds, and the continued transplanting of game birds to stock both old and new ranges. No additional comprehensive investigations of individual species were begun.

"Sixty-nine salaried Federal officers were available for the enforcement of wildlife conservation laws in the United States and 23 in Alaska. The former group obtained convictions of 2,567 violators who were punished by fines aggregating $75,215 and jail sentences of 2,826 days. In Alaska, 135 persons were convicted and $3,765 fines and 810 days in jail assessed against them. Most of the United States activities comprised enforcement of bird protective laws.

"Scientific collecting permits were reduced in number from 1,779 to 1,510. There was practically no change in the number of bird-banding permits, which on June 30 totaled 2,390. 1700 coöperators banded 177,898 birds, of which 30,783 were ducks and geese. The grand total of birds that have now been banded is 4,528,241 with returns or recoveries of 315,000.

"Because of loss of funds and of personnel, research relative to birds was practically on a maintenance basis except for investigations performed by the flyway biologists which were carried on with almost their usual intensity.

"It was estimated that the waterfowl population at its low point in 1934 was only about 27 millions. According to the January inventory of 1943, their numbers were between 115 and 120 millions, and the 1943 fall migration of the birds is expected to be the largest in several decades, possibly 150 million individuals. Despite the general increase, a few species, as the Redhead and Ruddy Duck, are not responding to protection as well as most of the others. The Woodcock seems to be increasing slowly but its populations are in need of careful management. The Wilson's Snipe is still on the decrease. The Mourning Dove is making a gratifying recovery but its numbers are still below the optimum desired. Special attention is being given to the White-winged Dove in order that its management may be improved.

"The increases in waterfowl and certain other birds are not without an objectionable aspect because they are resulting in increased damage to crops. It has been necessary to investigate, and to take certain measures for the control of, depredations in California, Idaho, Colorado, and Louisiana. Surprising though it may seem to many who have come to regard the Sandhill Crane as a vanishing bird, this species has increased to such an extent that, in its present rather narrow migration path, it is the subject of an annually increasing number of complaints on the score of crop damage. It may, therefore, be necessary to permit the application of repressive measures locally before the species has reoccupied its former range if indeed that objective can ever be achieved.

"The high prices for agricultural products and the pressure for maximum crops have made bird damage keenly felt and have resulted in demands for relief that cannot be ignored. Justified complainants in large numbers and over wide areas must be satisfied or the entire conservation movement will be injured."

(3) Department of Mines and Resources of Canada

In Canada, Mr. Hoyes Lloyd reports the establishment of additional sanctuaries and a lengthened open season on Ptarmigan. He sounds a warning note for the Wood Duck and for the Black Duck in the Maritime Provinces.

"1. The Government of the Yukon Territory established in the southwestern angle of the Yukon, 'Kluane Game Sanctuary,' with an area of about 10,130 square miles, in which no hunting or trapping is permitted.

"2. The open season for all Ptarmigan in the Northwest Territories was increased from four months annually to eight months, viz., September 1–April 30. Ptarmigan are very numerous in the Territories in relation to the human population and form an important food supply.

"3. Canada still gives protection to the Wood Duck by a closed season, but it will not be easy to continue this unless the United States returns to similar protection.

"4. In general, the reproduction of waterfowl has been good although scarcity of ammunition greatly limits hunting. There have been some reports of scarcity of Black Ducks in the Maritime Provinces.

"5. The following sanctuaries have been established under the Migratory Birds Convention Act:

'Ile aux Tourtes Bird Sanctuary'
a small group of privately owned islands in the Ottawa River near Montreal, established February 22, 1943.

'Ken-Wo Country Club Bird Sanctuary'
a golf course near Kentville, Nova Scotia, established July 5, 1943."

(4) U. S. Forest Service

"The major contribution of the Forest Service to bird life is perhaps in the protection and management of the vast area in the National Forests—about one acre in ten in the United States. Through fire control, regulation of forest cutting, grazing and other uses, the land is kept continuously productive. Thus, a favorable habitat is maintained, and in many instances is improved with the increase of plant species which provide food and cover for birds.

"Because of the curtailment of much of the wildlife work on the National Forests, there are no new undertakings to report in connection with the protection of birds for 1943. Efforts to improve the environment for certain birds have been brought to the attention of the American Ornithologists' Union in the past. These include:

(1) stabilization of lake levels and flowages, notably in the Lake States' forests for the welfare of waterfowl, (2) reservation of openings in the forests of Lake States for Sharp-tail Grouse, (3) development of clearings in the dense second growth forests of the South, (4) planting of food patches to encourage turkey in some areas in the South, (5) fencing of arroyos to provide quail with food and cover in the Southwest, (6) development of water for quail in foothill areas in California, and similar projects.

"Enforcement of the 12,000 acre closure and sanctuary for the California Condor, established on the Los Padres National Forest, has been continued. Latest reports indicate that the condor has increased somewhat during the past year, which is good news for this 'vanishing' species."

(5) U. S. Soil Conservation Service

"Despite wartime conditions, it has been possible to make considerable advances in those aspects of soil and moisture conservation work which are related to the improvement of bird habitats. Soil conservation districts, the farmer-organized and farmer-operated vehicle through which most soil conservation work is accomplished, now number more than 1,000 and embrace more than half a billion acres. The Soil Conservation Service has helped farmers develop conservation plans on about 80,000,000 acres and combined treatments have been placed upon one-half of these to date. This means that such practices as are useful to birds now form an impressive figure. Strip-cropping has been placed upon 3,494,000 acres. Woody plantings cover 714,000 acres. Grass plantings cover 2,688,000 acres. About 1,000 miles of shrub borders have been established along field edges. Farm and ranch ponds in districts now number 18,000. Nearly 2,000,000 acres of farm woodlands are protected from livestock and fire. About 75,000 acres have been planted primarily for wildlife and wild plant crops and through protection an even greater acreage has been allowed to revert to native vegetation.

"A most useful tool in the program to devote every acre of agricultural land to the purposes for which it is best adapted, is the classification of land according to its capability for use. On the basis of soil types, degree of erosion, slope and climate, farmland capability classes are established. Thus, lands suitable for sustained use in crop production may be so handled. Some lands are best suited to forage production or timber products. The Service has found that more than 33,000,000 acres of farm and ranch land are unsuited to the production of cultivated crops, livestock forage or timber. These acres

are largely coming to be known as 'wildlife lands' and are so treated. They include such places as marshes, streambanks, rock outcrops, strip-mined areas, and the like. Most of them present erosion problems which are best solved by treatments directly beneficial to wildlife.

"Birds are protected on a dozen State refuges on land administered by the Soil Conservation Service in ten states. In addition, there are a number of areas closed by the Department where such birds as the Mississippi Kite, Little Brown Cranes, and many other species receive protection.

"The Service finds indications, in the few ornithological studies that have been made, that combined soil conservation treatments result in 30 to 40 per cent increases of birds for farmlands as a whole, and some practices apparently double the number of birds in the fields on which they are applied. There are, likewise, notable increases in species."

(6) U. S. National Park Service

War has had its effect on the protection of birds and other wildlife on many units of the National Park System. Strenuous efforts have been made by the National Park Service to maintain its peacetime standards of patrols and investigations, but the loss of many experienced men has had inevitable results. Thus far, we believe, these results have not been serious in losses of wildlife. Discontinuance of investigations into wildlife conditions, however, may be more detrimental later.

"Numerous attempts have been made to open the national parks and monuments to practically unlimited grazing of domestic stock. Success of these efforts would have been highly injurious to many birds through destruction of habitats and food. All requests for new grazing allotments in the major parks and wilderness-type national monuments have been refused. Increases in other units of the National Park System have been permitted only where permanent damage would not result.

"Due to personnel shortages, it was not possible in 1943 to carry out wildlife studies and the annual census of Trumpeter Swans in Yellowstone National Park. General observations seem to indicate that the status of the species remains approximately unchanged since the last census in 1941.

The Superintendent, Hawaii National Park, has advised us that 'Nene' or 'Hawaiian Geese' have maintained their numbers within and outside of the park. Extensive road building in the Islands, unfortunately, is opening up large areas of the primeval range of this

rare species. Use of some hitherto wilderness tracts outside of Hawaii National Park probably has had a detrimental effect on several rare birds, including the 'Akepa' and 'Akiapolaau,' and the uncommon 'Elepaio' and 'Iiwi.'

"Unauthorized use of Bird Key, Fort Jefferson National Monument, as a bombing target by unidentified aircraft late in 1942 resulted in a fire that burned all vegetation. This and several less injurious acts of similar nature have been the subject of protests to the several military and naval establishments. Fortunately, the fire occurred outside of the nesting season, but the island will not be usable by the Sooty and Noddy Terns until it is revegetated.

"Progress has been made toward the acquisition of a large area of the offshore islands on the North Carolina coast, of which Cape Hatteras is a part. This is a famous wintering area for waterfowl. The State has indicated the present availability of approximately 12,000 acres of land, and has agreed to establish a fund of $75,000 for purchase of additional area. Prospects are good that further sums will be forthcoming as needed."

(7) Emergency Conservation Committee

Mrs. Edge, reporting for the Emergency Conservation Committee, tells of financing Mr. Richard E. Follett's "research to explore the possibilities of raising Trumpeter Swans domestically," in the belief that that is the only way to assure its perpetuation. This has not gone beyond the exploratory stage though she reports that it has elicited the interest of the New York Zoological Society and the American Wildlife Institute and has the permission of Dr. Gabrielson to use any Federal Sanctuary for the purpose.

Another interest of the Emergency Conservation Committee this year has been the protection of the Duck Hawk and Mrs. Edge would draw attention to the uncoöperative attitude of certain humane societies.—"In May, 1943, a Duck Hawk's nest was destroyed by the management of a hotel in New York, and the young birds were given into the charge of the American Society for the Prevention of Cruelty to Animals. The agent of the Society destroyed the young Duck Hawks. The excuse given by the executive was that his men could not identify the birds. In September, 1943, a humane society of New Rochelle, New York, asked for the destruction of a Duck Hawk's nest on the eleventh story of a building in New Rochelle because the Duck Hawks fed on pigeons. (This was in reality a late summer roost on the 12th floor.) This disaster was happily prevented through the coöperation of the New York Conservation Department."

PART B

PRESENT STATUS OF CERTAIN ENDANGERED SPECIES

(Information supplied chiefly by the U. S. Fish and Wildlife Service)

Whooping Crane

This species showed an increase of four birds during the winter of 1942–1943 over the previous winter's count, when 19 birds were seen on the Aransas Refuge, Texas; four of these were immatures and two young were seen in the same family group.

In Nebraska, however, according to A. N. Brooking, the numbers of migrating cranes reported each spring has dropped from 134 in 1934 to three in 1941, four in 1942, and one in 1943. This alarming report calls for action and the Committee believes that the Fish and Wildlife Service and the National Audubon Society should take immediate steps to learn the exact status of this species throughout its range and institute practical measures to forestall its extinction. A special study of this species similar to the one made of the Ivory-billed Woodpecker, the Roseate Spoonbill, and the Condor seems highly desirable.

Great White Heron

There has been no change in the status of this bird according to records in the files of the Division of Wildlife Refuges, and there is no indication that the increased naval and military activities in the vicinity of the Key West and Great White Heron Refuges, Florida, have interfered with these birds.

Trumpeter Swan

The swan count for the United States was hampered this year because the personnel of the Yellowstone National Park was not available to coöperate in the annual count made during August. However, officials of the Fish and Wildlife Service are most optimistic relative to the outlook for this species since careful censusing of the Red Rock Lakes Refuge, Montana, and lakes in the refuge's vicinity revealed a total of 171 swans on areas exclusive of the Yellowstone National Park. Based on records for the past several years, a population of 50 birds is a conservative estimate for the Trumpeter Swans within the Yellowstone National Park; this number, together with the 171 birds outside, would indicate a population of 221 swans in the United States in the fall of 1943.

In British Columbia, the Trumpeter Swan population, estimated to number approximately 500, appears to be fairly well stabilized.

The number of cygnets included in the wintering flocks shows a satisfactory annual increase that unfortunately is offset by winter losses. These are due more often to scarcity of food than to any other cause and the situation is being met on some of the wintering grounds by the feeding of grain. Other losses are caused by lead poisoning and, according to wardens' reports, by Bald Eagle predation. The environment of one important wintering ground has been greatly modified by accelerated deforestation, a product of war conditions. The situation there is being watched.

It is considered important for the welfare of the species that warden service and winter grain-feeding be expanded. Canadian authorities are aware of this necessity and undoubtedly these additional protective measures will be undertaken when conditions permit.

Roseate Spoonbill

The Sabine Refuge, Louisiana, played host to a new nesting colony of spoonbills this past spring, when some 35 pairs moved into the refuge from a near-by colony and began nesting. They selected Shell Hill, a most inaccessible place, and, although strong winds occurred during the incubation period, relatively few nests were destroyed. Fifty birds spent the summer of 1942 on the Indian Key Refuge, Florida, as is usual, and 40 were seen there again in the spring of 1943, according to last records received from that area. The Imperial Refuge, Arizona, was visited by ten birds in the fall of 1942, establishing the first record for that area since its establishment. Increased use of the Aransas Refuge, Texas, was noted in the fall of 1942 when 300 birds came into this area to feed. After nesting is completed on the Audubon Sanctuary, located on the Second Chain of Islands, near the Aransas Refuge, many of the adults and their offspring move into the area to feed. A spoonbill spent most of August, 1942, on the Great White Heron Refuge, Florida, according to Earle R. Greene, who also reports that the species occurs on the Marquesas Key, but that no nests have been located there to date.

Attwater's Prairie Chicken

This prairie chicken has not been seen on the Aransas Refuge, Texas, during the past year, but observations near the refuge indicate that nesting conditions have been favorable and a neighboring ranch reports a good population with many young birds. Strong concentrations were also reported from this ranch with many seen in the cultivated small grain fields.

Mearns's Quail

Ten birds were seen on the San Andres Refuge, New Mexico, during the spring of 1943.

Redhead

This species has shown a good increase on the national wildlife refuges during the past few years. In the fall of 1942, Susquehanna Refuge, Maryland, reported 10,000 present; 15,000 were estimated on the Bear River Refuge, Utah; 15,000 on the Valentine Lakes Refuge, Nebraska; 30,000 on Lower Klamath, California; and 15,000 on Mud Lake Refuge, Minnesota, for the same season. It is the most common duck on the Boulder Canyon Refuge during the migration.

Canvas-back

Large concentrations of this species were reported from many national wildlife refuges during the fall of 1942, some of which were as follows: Susquehanna Refuge, Maryland, 350,000 (these probably represented the bulk of the birds wintering along the Atlantic Coast); Bear River, Utah, 15,000; Lower Klamath, California, 40,000; Valentine Lakes, Nebraska, 15,000; and Chautauqua Refuge, Illinois, 10,000. Continued restrictions on the taking of this species during the hunting seasons are most desirable.

White-winged Dove

The Santa Ana Refuge, Texas, had a fairly representative portion of the estimated 250,000 birds of the Rio Grande Valley; the birds utilized the favorite nesting habitat along the ebony and mimosa-bordered resacas of the refuge.

Red-billed Pigeon

This species, which, in the United States, is restricted to the lower Rio Grande Valley, used the Santa Ana Refuge, Texas, during the past nesting season and an estimated 200 nesting pairs were seen. Ornithologists in this section of the country announced a high percentage of increase in the species for 1943.

Sandhill Crane

This species, which includes the Sandhill, Little Brown and Florida Cranes, appears to be continuing a most satisfactory comeback, according to accounts of birds seen on the various refuges. Large concentrations of Sandhill and Little Brown Cranes were noted on several national wildlife refuges during the 1942 fall migrations, including Lacreek Refuge, South Dakota, where 14,000 were estimated;

Crescent Lake, Nebraska, with 11,000; Muleshoe Refuge, Texas, with 5,000; Lostwood Refuge, North Dakota, with 2,500; and Aransas, with 1,500 birds. Bitter Lakes Refuge, New Mexico, reported that 12,000 used that area in the spring of 1943, being of the smaller or Little Brown form. A satisfactory nesting season occurred on the Okefenokee Refuge, Georgia, for the Florida Crane during 1942, and an estimated 500 birds were present in the fall. Mr. W. F. Kubichek, of the Fish and Wildlife Service, observed and photographed a concentration in excess of 100,000 cranes along the Platte River near Hershey, Nebraska, during the spring of 1943.

PART C

Discussion

1. We commend the various organizations for their accomplishments during the year, 1943, and particularly the National Audubon Society, the U. S. Fish and Wildlife Service, and the Soil Conservation Service which, in spite of the handicaps resulting from a world war, have been able to carry on with a greatly reduced personnel.

2. We commend the establishment of the Audubon Nature Center and hope that it will stimulate the desire to establish many local sanctuaries, private or public, because of their beneficial influence in encouraging and fostering bird life. Many of these already established by various birds clubs are doing an excellent work but their number should be greatly increased.

3. We regret that no feasible plan has been found either by the National Audubon Society, the Fish and Wildlife Service, or the National Park Service to acquire a refuge for the Ivory-billed Woodpecker. We feel that at least a portion of the virgin forest known as the "Singer Tract" should be acquired by the federal government as a national monument or wilderness area before it is too late.

4. We recommend that the National Audubon Society, in conjunction with the U. S. Fish and Wildlife Service and the proper authorities in Canada and Mexico, inaugurate a study of the Whooping Crane with a view to preventing its extinction.

5. We believe that the Wood Duck and the Woodcock should be removed from the game list and we commend the Fish and Wildlife Service for continuing the closed season on the Wilson's Snipe and the reduced bag limits on Ruddy Ducks and Buffleheads.

6. The Trumpeter Swan, Whooping Crane, Ivory-billed Woodpecker, Eskimo Curlew, and California Condor represent a special category of birds not only protected by Federal, State, and Provincial

laws, but exempt from scientific collecting. We recommend that certain other endangered species (List A), having a limited breeding range or a paucity of individuals, be included in this category and that the collecting of them for scientific purposes be permitted only with the special approval of the Federal, State, or Provincial agency concerned.

7. We believe that certain other species protected by Federal, State, and Provincial laws (List B) are rare within the United States and Canada, even though certain of them are more common in regions to the south. We recommend, therefore, that additional protection be given them by further limiting the number that can be taken in any one year or by any one collector for scientific purposes.

It is highly desirable that further information regarding the status of all rare birds should be available and the Committee, therefore, invites every member of the A. O. U., who has additional information gained from recent observations, to make his data available either directly to the Committee or through publication.

A	B
ADDITIONAL BIRDS THAT SHOULD BE GIVEN COMPLETE PROTECTION	BIRDS WHOSE NUMBER SHOULD BE WATCHED CAREFULLY AND GIVEN GREATER PROTECTION THAN AT PRESENT
California Clapper Rail	Great White Heron
Hudsonian Godwit	Eastern Glossy Ibis
Kirtland's Warbler	Roseate Spoonbill
Bachman's Warbler	Short-tailed Hawk
Cape Sable Seaside Sparrow	Everglade Kite
	White-tailed Kite
	Long-billed Curlew
	Bristle-thighed Curlew
	Aleutian Tern
	Whiskered Auklet

8. STATUS OF THE DUCK HAWK. In the past year the Duck Hawk has probably benefitted somewhat from the ammunition shortage among sportsmen. Under special protection the population in one area in the east has increased from five to ten pairs in the last ten years. In California, four eyries were broken up by target practice and gun emplacements of the armed forces (R. M. Bond). In British Columbia, the species is believed to be decreasing. One of the chief nesting grounds for the race *pealei* has lost its isolation because of

the conduct of military operations in the vicinity and a reduction in numbers can be expected (J. A. Munro). In the Mississippi Valley, the rediscovered remnant of tree-nesting birds appears to be in no immediate danger (W. R. Spofford). The apprehension of would-be falconers at a protected eyrie in New York has been followed closely and is not yet believed to be characteristic of the falconry movement at this time. We commend the action of W. C. Adams and the New York State Conservation Department in refusing permits to kill the birds in New York City and at the Bear Mountain Bridge.

9. CANADA GEESE.—We view with alarm the enormous legal destruction of Canada Geese at the Horse Shoe Lake Refuge and Public Shooting Ground in Illinois. The 1943 kill in this area was approximately 11,000 birds, not counting the cripples, and may represent twenty-five per cent mortality of the main flock of Canada Geese using the Mississippi flyway. We trust that the Fish and Wildlife Service and the Illinois State Conservation Department will be able to adjust the regulations controlling the taking of these birds so as to guarantee their perpetuation.

10. THE COMMITTEE ON BIRD PROTECTION.—We recommend that the A. O. U. Committee on Bird Protection be composed of three active members responsible for the publication of an annual report and not more than fifteen advisory members. These shall be either past members of the Committee or members so strategically located about the country that they can transmit first-hand information to the active committee on the status of endangered species and call attention to any matters concerning the conservation of bird life that are not being properly attended to in their respective areas.

Respectfully submitted,

A. A. ALLEN, *Chairman*
P. L. ERRINGTON
J. J. HICKEY
J. A. MUNRO
D. STONER

NOTE.—A minority statement by one of the members of the Committee, criticizing various portions of the foregoing report, was forwarded by the Chairman late in May. It is unfortunate that the points at issue were not reviewed by the whole Committee, but under the circumstances, the President and Editor believe that the critique should be reserved for discussion by the Committee or at a meeting of the A. O. U. before publication.—ED.

GENERAL NOTES

A hybrid Costa's × Broad-tailed Hummingbird.—During June, 1932, a party from the San Diego Society of Natural History collected birds and mammals on the upper reaches of the Rincon Mountains in Pima County, south-central Arizona. The Rincons are a spur of the higher Santa Catalina range and lie in a southeasterly direction. A rather low gap separates the two pine-clad groups. Among the birds taken was a single male hummingbird, by J. W. Sefton, Jr., at Manning Camp on June 21, that with but a casual glance was identified as *Calypte costae*. It was placed in the Society's collection as specimen No. 15883.

Recently the writer had occasion to review birds from this locality and found to his surprise that this hummingbird differed from the other adult male Costa's Hummingbirds in the series. Since the tropical species considered necessary to carry out a comparison were not at hand, the specimen was sent to A. J. van Rossem, Curator of the Dickey Collection at the University of California in Los Angeles. Mr. van Rossem commented as follows:

"I cannot imagine it as anything other than a good hybrid between *Calypte costae* and *Selasphorus platycercus*, both of which species are presumably common in the Rincons and are the only two which could produce the combinations shown —'spotty' crown, color of throat intermediate, tail characters also intermediate including length.' So far as I am aware, this is the first hybrid between these two species to be taken. You should record it. The little mistake is being returned today."

In the belief that Dr. Alexander Wetmore, of the United States National Museum, would be interested to see so unique a specimen, the bird was forwarded to him. He wrote:

"I agree with van Rossem that it seems to be a hybrid between *Calypte costae* and *Selasphorus platycercus*. The form of the tail and gorget are like *Calypte* except that in the latter the produced end has the feathers more rounded, somewhat as they are found in the *C. anna*. The larger size agrees with *Selasphorus*. The color of the crown and the gorget are intermediate between the two, and the reduction of the brilliant color of the crown is suggestive of the larger bird. The slight emargination of the tip of the outer primary is intermediate also, being suggestive of *Selasphorus*. It is an interesting specimen that I am glad to have seen."

Herewith are more descriptive details of this truly "interesting specimen." The rich purple of the gorget of *Calypte costae* and the brilliant carmine of *Selasphorus platycercus* are harmonized in the gorget of the hybrid to a metallic purplish-red. The feathers of the throat are also broader and more rounded, neither fine as in *S. platycercus* nor lanceolated as in *costae*.

The top of the head of *Selasphorus platycercus* is greenish, slightly darker than its brilliant green back, while *Calypte costae* has a purple head, similar in color to its gorget. The hybrid combines the two in having a speckled head, some of the feathers of which are green as in *Selasphorus platycercus*, and others metallic purplish-red, showing the *Calypte costae* inheritance.

The form and measurements of the hybrid's wings and tail are also characteristically intermediate between those of both parents, as shown in the following table where the measurements of a typical adult male of the two named species are used in the comparison.

	Calypte costae	*Hybrid*	*Selasphorus platycercus*
Length of wing	45.5 mm.	48.3 mm.	49.2 mm.
Width of outer primary 10 mm. from tip	3.2 mm.	2.4 mm.	1.5 mm.
Shape of tip of outer primary	rounded	attenuated	pointed
Length of tail	22.0 mm.	28.1 mm.	32.2 mm.
Width of outer tail feather 10 mm. from tip	1.5 mm.	2.9 mm.	5.2 mm.
Width of second tail feather 10 mm. from tip	4.1 mm.	4.5 mm.	6.1 mm.

The color of the underside of the second tail feather shows an interesting combination of the two parental lines, but not a blend. The distal half of this feather, though lacking the white tip, is otherwise colored much like the corresponding feather of *S. platycercus;* the basal section shows primarily *C. costae* influence.

The bird was collected in the conifer belt and within the Transition Zone as it is known in Arizona. In this zone *Selasphorus platycercus* breeds sparingly. On the other hand, *Calypte costae* breeds in the two Sonoran zones which are below the conifer belt, but ascends into higher associations after it has nested. The hybrid was presumably a product of parents that has lived in the intermingling borderline section. Being more than a year old, it had probably returned to the general region where it had been raised. At any rate, the date of capture, the locality, and the unique characters of this hybrid add a mite to our knowledge of these brilliant little birds, for which southern Arizona is the outstanding area in the United States.—LAURENCE M. HUEY, *San Diego Society of Natural History, Balboa Park, San Diego, California.*

Observations on interspecific sexual behavior between a chicken and a pigeon.—For the past year, observations have been made on the social behavior of a number of species of birds kept in a former greenhouse adjoining the biological laboratories of Wabash College, at Crawfordsville, Indiana. The greenhouse is heated by air blown in from a nearby animal room.

The present observations were made in the early afternoon of March 9, 1944. The day was fair and warm, with the sun shining. The temperature in the greenhouse was between 65 and 70 degrees F., a marked increase over the temperatures of the past week.

While several hens, a male chick, and a pigeon were being fed and watered, the pigeon and one of the hens were seen at a feeding tray apart from the other birds. The first unusual behavior which caught the attention of the observer was a loud and continued cooing note from the pigeon. This peculiar type of vocalization had not been heard from this bird recently. The pigeon approached the hen as the latter began to feed, and pecked vigorously at the head of the larger bird. At first sight, this behavior appeared aggressive, as if the pigeon were defending the territory around the feeding tray. However, when the behavior was repeated several times, it was evident that it was sexual.

The pigeon continued its pecking and cooing. The bird would rapidly walk up to the hen, peck at the auricular region of the latter, then thrust its small head completely under the feathers of the hen. With its head thus buried beneath the plumage of the wings, sides, or flanks of the hen, the pigeon appeared to move its head about, pecking continuously. The hen fluffed up her feathers, and seemed to enjoy the procedure.

Another action of the pigeon at this time was an occasional strong flapping of

the wings. Several times the hen was struck on the side of the head by the beating wings of the smaller bird. The pigeon did not fly during the period of observation, although several times a type of hopping dance was performed before the hen. All these actions suggested male courtship behavior.

One of the interesting points about this behavior was the attitude of the hen to the advances of the pigeon. During an observation period of at least thirty minutes, the pigeon repeated this characteristic behavior eight or ten different times. The hen showed two different reactions. Either she walked away, followed rapidly by the pigeon, pecking at her head, or she stood quietly and allowed the pigeon to carry on its pecking and head-burying technique with apparent indifference or, perhaps, pleasure. The change in the typical behavior of these two birds was impressive: the calm pigeon was aggressive and active, while the hen became docile and submissive. This is a good example of the effects of the sexual hormones on behavior.

When one realizes that these birds are only distantly related, being classified in separate orders, the behavior described becomes even more interesting. Yet the full significance of the relationship can not be appreciated unless one is familiar with the earlier story of these individual birds.

The pigeon was obtained in September of last year (1943) as a young bird that had fallen from its nest. Its sex was not known, although it is now assumed to be a male. This bird lived for several weeks with a number of adult Bob-whites and some chickens kept in the greenhouse. During this period the pigeon learned to fly.

Two White Austral chicks, about two weeks of age, were placed in the greenhouse with the other birds in September. An unusual relation was soon established between the pigeon and the two chicks. The former bird acted for a long period of time as a foster mother to the two young birds. The three birds remained in close contact at all times. Often the chicks pushed their way under the pigeon; the latter offered no resistance to this act. To all appearances, the pigeon took the place of a brooding mother hen. The chicks also approached the quail, but those active, nervous birds would have nothing to do with them. A close social unit was established among these three birds, and even today, about seven months later, they are always together, act as a group, and often keep apart from other birds. Kodachrome motion pictures were taken of this unusual social group.

This interspecific relation caused several changes in the social behavior of the pigeon. For a period of many weeks, until the chickens were large enough to perch off the ground, the pigeon rarely flew, although perfectly capable of so doing. The few occasions on which flight was observed were instances of great alarm. The pigeon was also observed to defend "her" chicks by pecking vigorously at quail entering a territory which the three birds often occupied. In fact, that portion of the greenhouse was so often occupied by the pigeon and the two chicks that it was designated "pigeon corner."

No fighting has ever been observed among these three birds. Yet, when other birds have been introduced into the greenhouse, peck-orders have usually been established, especially among the chickens. One of these two chicks, now about seven months of age, is the hen whose attitude toward the sexual behavior of her foster parent, the pigeon, has been described in these notes.

The morning after this behavior was noted, the first egg of the season was laid in the greenhouse. It would be of interest to prove that the sexual behavior of

the pigeon may have stimulated the hen to lay an egg, but this is not definitely known as there was another hen present at the time.

No other sexual behavior on the part of the pigeon has been noted in the past week (preceding March 15).—Howard H. Vogel, Jr., *Wabash College, Crawfordsville, Indiana.*

Greater Snow Geese near Quebec in 1634.—Absolute proof has been lacking that the Greater Snow Goose (*Chen hyperborea atlantica*) had, before about 1870, been seen on the migratory feeding grounds in the area covered by Cap Tourmente, Ile aux Oies, Ile aux Grues, La Batture aux Loup-Marins and vicinity about thirty miles east of Quebec, although there is recorded and traditional evidence of the presence there of 'oyes,' 'oies,' 'oies sauvage,' 'oies blanches et grises,' and 'oies blanches.'

Although the French word 'oie' is used to mean 'Snow Goose' in the area near Quebec frequented by the Greater Snow Goose, it actually means 'goose,' so there is reason to believe that 'oie sauvage' might mean 'wild goose' of any kind. 'Oies blanches' means 'white geese' and, unless tame white geese are meant, must refer to Snow Geese.

Most conclusive evidence of the presence in the Cap Tourmente area of Snow Geese is found in the report of Père Paul Le Jeune in 'Les Relations des Jesuits' for the year 1634, the original and translation of which are contained in The Champlain Society Edition, edited by R. G. Thwaites, Cleveland, The Burrows Co., 7: 73–79, 1896. Père Le Jeune gives a detailed account of a trip he made with twenty Montagnais Indians, among whom were a Sorcerer, an Apostate, and women and children, to spend the winter with them in the country east of Quebec on the south shore of the St. Lawrence River.

At 10:00 A. M., October 18, 1634, the party set sail from Quebec and passed the Island of Orleans to an island known by the Indians as 'Ca Ouhascoumagakha.' While some of the party were out securing game for supper and the women were erecting the shelter, the Apostate returned to the boat and drank so much of the keg of wine which Père Le Jeune had consented to include among the supplies with the promise it would be used only with his consent, that he became raving drunk, broke down the shelter, tipped over the supper kettle, and threatened the life of Père Le Jeune, until he was finally subdued. Père Le Jeune retired at some distance to pass the night.

In the morning (Oct. 19, 1634), the tide fell sooner than expected and it was necessary to await the evening for arrival at midnight at the Island of Ouapascounagate.

The original text of the Jesuit Relations reads:—

> "Le lendemain (Oct. 20, 1634) nous quittasmes cette
> Isle pour entrer dans une autre appellee Ca Chibariouachcate.
> Nous la pourrions nommer L'Isle aux Oyes blanches, car
> il y en vis plus de mille en une bande."

The R. G. Thwaites Edition (7: 79) gives the above French text and the following translation:

"The next day we left this Island to go to another one called Ca Chibariouachcate; we might have called it the Island of the White Geese, for I saw there more than a thousand of them in one flock."

The translation continues:

"The following day (Oct. 21, 1634) we tried to leave but the bad weather compelled us to land again at the end of the same Island.

"It is a solitude, like all the country; that is, it has only temporary inhabitants as these people have no fixed habitation.

"It is bordered by rocks so massive, so high and so craggy, and is withal covered so picturesquely with Cedars and Pines, that a Painter would consider himself favored to view it, in order to derive therefrom an idea of a desert, frightful in its precipices, and very pleasing in its variety and number of its trees, which one might say had been planted by the hand of art rather than of Nature.

"As it is indented by bays full of mud, there hides here such a quantity and variety of game, some of which I have never seen in France, that it must be seen in order to be believed.

"Leaving this Island of game, we sailed all day and towards nightfall landed at a small Island called Atisaoucanich etagoukhi, that is, place where dyes are found. I am inclined to think that our people gave it that name, for they found there some little red roots which they use in dyeing their Matachias. I would like to call it the Isle of Misfortune; for we suffered a great deal there during the eight days that the storms held us prisoners."

It should be noted that October 20 is the approximate date when, each year in recent years, the flock of Greater Snow Geese is at its peak in the above area, stopping there until late November on its migration from its nesting grounds in Baffin Land and farther north to Virginia and North Carolina; and it is interesting to note that, on October 21, 1932, 298 years after Le Jeune and during the annual meeting of the American Ornithologists' Union in Quebec, the members present visited the Cap Tourmente area to view the only known flock of Greater Snow Geese.

The Père Le Jeune description of the country is a most accurate picture of the area, with the high rocky cliffs of Cap Tourmente in the background.

The same translation of the Relations for the year 1662, Vol. 48, page 157, reads:

"The Isle aux Coudres, the Isle aux Oyes, and the Isle of Orleans deserve mention in passing. Elk are found on the first named, often in great abundance. The Second is frequented in their season by 'une multitude d'oyes, de canards and d'outardes' so that the Island which is flat and grass covered like a prairie, appears to be quite overrun with them."

Père Le Jeune, in writing of food in general in Vol. 6, page 271, says:

"Pour les oiseaux, ils ont des Outardes, des Oyes blâche & grises, des Canards."

With the elimination of all possibly doubtful evidence, the fact remains that, in 1634, Père Le Jeune saw, in this area, on October 20 (which date is, today, the peak of the annual migration of the Greater Snow Geese), a flock of more than 1000 white geese (oyes blanches) which, from the size of the flock, could not have been tame geese, and from their color could not have been of another species, with the exception of the Lesser Snow Goose, which is unknown in eastern America. The natural conclusion is that the flock seen by Père Le Jeune in 1634 was of Greater Snow Geese.—Ivers S. Adams, *Hardwick, Massachusetts.*

An Arizona nest of the Coppery-tailed Trogon.—On May 31, 1939, it was my good fortune to find the nest of a Coppery-tailed Trogon (*Trogon ambiguus ambiguus*) in the Santa Rita Mountains about 50 miles south of Tucson, Arizona. Since my observations on this nest do not agree with the description of nests found in Mexico by Frank B. Armstrong (recorded in A. C. Bent's recent monograph, 'Life Histories of North American Cuckoos, Goatsuckers, Hummingbirds and their Allies'; U. S.

National Museum, Bull. 176) and, since there seems to be no published description of a nest within the borders of the United States, it seems wise to offer the following rather incomplete observations.

Charles Brand, David Allen, and the writer were on a bird-sound recording expedition in Harlingen, Texas, headed for Arizona, when we first heard from Mr. and Mrs. Roger Peterson of the whereabouts of the particular trogon whose nest we later found. The Petersons had just come to Harlingen from the Santa Rita Mountains and in turn had been shown the bird by Major Allan Brooks. Arriving in Tucson, where we were entertained by Allan Phillips, we were guided to the trogon area by Professor Charles Vorhies and one of his students, William Proctor, so that the discovery was really a coöperative one. We had hoped that William Proctor would be able to continue our observations on the pair of birds, and I understand that he did make further observations and perhaps even located other nests, but my efforts to get in touch with him have been unavailing and make the publication of this note seem desirable.

Our party left Tucson on May 30 at 4 A. M., headed for the new road up Madera (White House) Canyon in the Santa Ritas. We stopped for a couple of hours in the foothills observing other birds and again at the upper end of the road, at the last camp site, but we found the trogon without great difficulty where it had been seen previously, less than a mile below the upper end of the road and opposite "Jimmie's Camp." On this day it flitted up and down a small ravine that parallels the road some 200 yards to the west, but it gave us no indication as to whether or not it was nesting except that it occasionally gave its 'turkey-hen' call as it had been doing, according to report, all spring. The female was nowhere in evidence.

Professor Vorhies and William Proctor returned to Tucson but Charles Brand, David, and I camped on the spot in the hope of recording the voice of the trogon the next morning as well as the notes of the Olivaceous and Sulphur-bellied Flycatchers that were calling near-by.

The next morning the trogon did not start calling until seven o'clock, but when I made my way in its direction with the microphone it flew farther away as it had done the previous day. Since I could go no farther with the cable, I set up the microphone to record a Black-headed Grosbeak that was singing from its nest about ten feet up in a sapling. While we were recording this bird, the trogon came back and gave me such an inquisitive stare that I surmised he had something of interest to himself in the neighborhood. Since there were quite a number of cavities in the oaks that covered the ridge where I was standing, I decided to investigate them after breakfast. When I returned to the spot about eight o'clock, the trogon was nowhere in sight, but after I had climbed two trees, when I placed the ladder against the third tree, which contained an old woodpecker hole nineteen feet from the ground, and started to climb, the male trogon appeared from somewhere, alighted about ten feet from my face and stared at me for over a minute. Realizing that I must have found his nest, I removed the ladder so as not to disturb him further and set up a blind on the ground about 25 feet away. Within half an hour the female trogon appeared and flew directly to the nest hole while the male alighted on a branch some ten feet away and uttered some low growling notes quite different from the *'ooeek-ooeek-ooeek'* which represents his song. The female trogon clung to the entrance hole for several minutes, looking in, but did not enter, and when she flew away the male left with her. That afternoon we built

a scaffolding in a near-by oak and the following morning hung a grass-mat blind on a level with the nest hole so that we could make observations and photographs without being seen.

At 6:20 the following morning, the male trogon flew to the nest hole and clung to the outside like a woodpecker, looking in for about five minutes before entering, and then remained inside for twenty minutes. He then departed, perhaps in search of the female. At 8:30 he returned and perched on a branch ten feet from the nest for an hour before the female arrived. She clung to the entrance for several minutes but did not enter, and when she departed the male took the same position for five minutes before entering the nest where he remained for another 20 minutes. Then the female returned, looked in the hole, and remained a few minutes, and when she flew away, the male followed her. The female soon returned alone, however, slowly entered the hole and remained for 20 minutes before departing, as had the male.

This behavior indicated to me that she probably had laid an egg and that incubation had not yet started, so I left the blind and proceeded to an Arizona Jay's nest. In all their behavior the trogons were exceedingly deliberate except when actually alarmed.

The following day, we had to leave for points north and west, so I decided to examine the nest and risk disturbing the birds in order to get some exact measurements. With the aid of a flashlight and a mirror I was able to view the bottom of the nest cavity quite clearly from a somewhat uncomfortable position, and there, without any pretense of a nest, lay two pure white, broadly oval eggs similar in appearance to those of a Kingfisher but somewhat smaller. The smooth, hard-packed bottom of the cavity showed one tiny dead live-oak leaf that had probably blown in but nothing else that could be construed as nesting material. This is in agreement with the nests of Mexican Trogons (*Trogon mexicanus*) in Guatemala described in 'The Auk' for July, 1942, by Alexander F. Skutch, rather than that of the Coppery-tailed Trogon given by Bent who apparently quotes Armstrong's collectors: "The nests were made of various materials, such as hay, straw, trash, moss, wool, down, feathers, vines, and thistle down."

The nest hole was apparently dug by a Flicker or Mearns's Woodpecker but was somewhat worn or uneven at the top so that it measured four inches in height but only two inches in width. The tree itself was alive but there was a dead stub just above the nest cavity and apparently decay was continuing down the main trunk. From the bark to the back of the cavity was five and one-half inches and the cavity itself was 14 inches deep.

The nest was conveniently situated about 25 feet from the road and was visited by a number of ornithologists after we left, including Prof. Charles Vorhies and P. A. Taverner, and I understand that the birds successfully hatched and reared their young.—A. A. Allen, *Laboratory of Ornithology, Cornell University.*

Food of White-rumped Shrikes.—An examination of the stomach contents of 65 White-rumped Shrikes (*Lanius ludovicianus excubitorides*) collected in Utah since 1934, revealed the following recognizable material to be present: 183 Orthoptera—139 adult and nine nymphal grasshoppers, twelve field crickets, one sand cricket and one mantid; one Neuropteron—an adult ant lion; three dragonflies; twenty-four Hemiptera—ten being pentatomid bugs (including three *Chlorochroa sayi*); eight Homoptera—including two cicadas; 143 beetles, among them twenty-eight scarabaeids including injurious species, twelve long-horned beetles (two *Prionus cali-*

fornicus), three click beetles (one a *Ludius inflatus*), one blister beetle (*Lytta cooperi*), thirteen ground beetles, five silphids, three darkling beetles, and nine weevils; ten Lepidoptera, including three cutworm larvae; thirteen Diptera including one horsefly, one deerfly, three crane flies, and three maggots (probably parasites digested out of grasshopper bodies); fifty-four Hymenoptera included andrenid and megachilid bees, psammocharid, sphecid and vespid wasps besides thirteen winged and three apparently wingless ants. Also included were parts or all of eight lizards, five *Uta stansburiana stansburiana*, two *Sceloporus graciosus graciosus*, and one gridiron-tailed lizard, *Callisaurus draconoides ventralis;* four spiders; one scorpion; part of one immature bird; and two shrikes had fed on skin and flesh of rodents, probably ground squirrels. G. F. KNOWLTON AND F. C. HARMSTON, *Utah Agricultural Experiment Station, Logan, Utah.*

A Nutcracker's search for buried food.—It is by no means unusual for the Clark's Nutcracker (*Nucifraga columbiana*) to forage for food on the ground in winter. The bird frequently seeks out the carcasses of dead animals that may be more or less covered with snow. In these cases, sight may play a large part in finding food. The following incident seems to indicate that the nutcracker can find small food objects, completely hidden, by other means.

On January 19, 1943, I snowshoed from the loop highway down Blacktail Deer Creek to the junction of that stream with the Yellowstone River, near the north boundary of Yellowstone National Park, Wyoming. The exposed plateau seemed almost devoid of birdlife for snow was falling and swirling in the strong wind. The temperature was about 20 degrees above zero.

On the north side of a ridge about a mile south of the Yellowstone River, a Clark's Nutcracker was flushed from the ground under a large Douglas fir. The bird flew off and I investigated the spot. As it was partially protected by the fir foliage, the snow was only about eight inches deep.

The nutcracker had dug a hole three or four inches in diameter at the top, at an angle of perhaps 30 degrees, through the hard-packed snow to the sloping ground. At the bottom of the excavation, frozen to the ground litter, was a Douglas fir cone. I was unable to determine whether the bird had just started to extract the seeds or whether it had been trying to pry the entire cone loose in order to carry it to a safe perch.

The remarkable feature of this performance was the accuracy with which the hole had been dug. Evidences on the snow showed that, without any exploratory digging, the nutcracker had driven its tunnel unerringly to the isolated food. The snow was sufficiently deep so that the presence of the cone could not have been apparent on the surface. The fox squirrel is known to dig for food as accurately, on occasion. The chief sense employed by that mammal seems to be smell, with memory as a possible accessory aid. By what method did the nutcracker locate its hidden food?—VICTOR H. CAHALANE, *National Park Service, Chicago, Illinois.*

Leopard frogs devouring small birds.—Some interesting instances of leopard frogs devouring live birds have come to my attention during the last twelve years or so. These may be worth recording since it is fairly certain that but few of such occurrences have been witnessed by humans although they may be fairly common in nature. Those of us who have kept captive frogs have observed that they can capture and swallow objects that are a very substantial fraction of the size of the frogs, themselves, and also that movement incites a frog to attack almost anything that is not too large to swallow.

My first instance came from a man living at Gull Harbor, about ninety miles from the south end of Lake Winnipeg. He and a companion, in 1929 or 1930, saw a large frog leap at a hummingbird that they were watching and capture it. They tried to recover the frog, but it escaped under a shed. The bird was hovering at a flower when seized.

The second instance was related by a man living near Portage la Prairie who also observed a large frog take a hummingbird while the bird hovered at a flower.

My third instance was related by my friend, the late Hugh Moncrieff, of Winnipeg—a keen naturalist and nature photographer. He was at his summer cottage at Gimli in the summer of 1939, and was watching a male Ruby-throated Hummingbird hovering at some flowers. He had intended to get out his motion-picture camera and photograph it in color. While trying to estimate the exposure and general situation in advance, he heard a snap and saw a frog fall on the flower-border while at the same time the bird had disappeared. He chased the frog but it escaped under his cottage. He called some boys to help and they recovered the frog in about fifteen minutes or less. He then instructed the boys as to killing the frog and dissecting it to recover the bird. While the operation was going on, Mr. Moncrieff took a moving picture showing the recovery of the hummingbird.

My fourth case occurred in August, 1940, to Mrs. Osborne Scott, whose husband is Passenger Traffic Manager, Canadian National Railway Co. In her garden at the summer cottage at Victoria Beach, on Lake Winnipeg, Mrs. Scott had adopted "an enormous green frog with large black spots" which had complete liberty. This frog was basking in the sun of an old camp bed in the garden, only three or four yards from where Mrs. Scott was sitting on the verandah. A waterhose was playing on the flowers and a leak in the pipe sent up a fine spray near the frog. A few Yellow Warblers were playing in the spray, sometimes flying through it very near the frog. She saw the frog leap about two feet into the air and seize a Yellow Warbler as it flew past. She ran out and found the tail and legs of the bird still protruding from the frog's mouth while the frog had its 'hands' on the tail. The frog soon swallowed the bird completely.

I am unable to state definitely that the frogs were leopard frogs, but that identification is, in my opinion, almost conclusive in every instance, due to the fact that the only frog in the province large enough to handle anything like a hummingbird is the leopard frog. I know of no records of the bullfrog in the province, and the next largest frog we have is the northern wood-frog (*Rana sylvatica cantabrigensis*). The leopard frogs, furthermore, are the only really spotted frogs we have here.—L. S. T. Norris-Elye, *Manitoba Museum, Winnipeg, Manitoba.*

Observation on the food of the Bronzed Grackle.—Although aware of the wide variety of foods taken by the Bronzed Grackle (*Quiscalus versicolor*), I was surprised to find two birds catching, killing, and devouring small leopard frogs (*Rana pipiens*). These grackles were observed in a small, swampy woodlot adjacent to the St. Bonaventure College campus, near Olean, New York. On June 20, 1943, I saw what appeared to be a sick or wounded grackle fluttering about a small pool of water lying in a hollow of the woodlot. When I approached the bird, however, it behaved quite normally and took wing. The next day, June 21, I noticed two birds going through the same performance. Circling the pool, they would suddenly run along the ground, fluttering their wings, and jab viciously at the small frogs which abound in the pool. I watched while the birds killed three frogs, then frightened them away and examined the remains. Each frog was neatly

pierced with a bill-sized gash in the soft throat or near the eyes. None of these frogs exceeded eight centimeters in length.

June 23 found three birds at the pool, but one flew at my approach. I observed one bird eating a frog in a small oak above the pool and noted that the other was actually in the water and that the belly feathers were wet. This bird repeatedly stabbed at frogs and missed, but I later found two dead frogs floating in the pool; both had been pierced through the head. Here again the frogs measured about eight centimeters in length and though there were larger frogs available, these smaller ones were apparently easier to catch and handle. The last bird was seen at the pool June 24; one frog was taken into the small oak and eaten. The grackle held the frog across the branch in hawk-like manner with one foot, and tore the flesh with its bill. All birds observed were adults.—STANTON GRANT ERNST, *Dept. of Forest Zoology, New York State College of Forestry, Syracuse, N. Y.*

Nestling House Wrens hatch a foster egg.—The ability of young birds in a nest to incubate and hatch eggs by their own body warmth was tested and proved by a family of House Wrens (*Troglodytes aëdon*). In my yard were two families of nesting House Wrens. The parent females were banded 139-72379 and 41-98935. For convenience, they shall be called no. 79 and no. 35. No. 79 laid her five eggs July 7 to 11, 1943. On July 17, when no. 79's eggs had been incubating six days, no. 35 laid her first egg. This was marked and left in the nest. On July 18, the second egg was laid before 8 A. M. and was immediately removed, marked on each end with a single painted dot, and placed in the nest of no. 79. The next day, before 8 A. M., the third egg was marked with two dots and placed in the other nest. Later eggs were treated in like manner. The evening after the fifth egg was removed, the mother bird, no. 35, was caught and found to have another egg ready to be laid the next morning, but that sixth egg was not deposited in this nest and the mother was never seen again. Then no. 35's first egg was removed and placed in the nest with the others. These foster eggs seemed to remain in the positions in which they were placed, and surrounding the eggs properly belonging to that clutch. I enlarged the cavity slightly, to make a base large enough to hold the ten eggs without over-rolling. On July 24, three of the eggs of wren no. 79 were hatched and two more were hatched early the next morning, the 14th day. With five young birds to feed, the parents had little time to brood them and to warm the foster eggs. Numerous observations showed that the adults spent only enough time within the box to feed their young, which grew rapidly. On August 2, one of the foster eggs was hatched; it had been laid July 17. This young bird was scarcely larger than the heads of the older birds, and although I would place it upon their backs and it held its mouth open, I do not believe it received any food. It died the next day. The other eggs were not hatched, but three of them were advanced in incubation; one was not fertile. After the brood of wren no. 79 left the nest on August 9, I examined the remaining foster eggs and found well-developed feathers in one, progressively less developed features in the others, showing that had the foster eggs been added to the second nest earlier possibly all might have been hatched and reared.—HAROLD B. WOOD, *Harrisburg, Pennsylvania.*

Age of a Red-vented Bulbul.—"Billy," a Red-vented Bulbul (*Molpastes cafer*), long-time resident of the Los Angeles County Museum, escaped through an open window, February 20, 1944, during a very heavy rainstorm. He was picked up dead six days later, probably a victim of the inclement weather. The writer has

been acquainted with the bird for seventeen years past, and the following additional information was furnished by Miss Irene Tillinghast. The bird was hatched in Kandy, Ceylon, in May, 1925, and arrived at the museum early in 1927. Therefore, his age at the time of his death was eighteen years and nine months.—G. WILLETT, *Los Angeles County Museum, Los Angeles, California.*

Nesting of a Song Sparrow on a salt marsh.—Coastal salt marshes are very favorable feeding grounds for song birds because of the abundance of insects and seeds to be found there. Such marshes make treacherous nesting territory, however, because they are periodically inundated, for the most part, with the spring high-tides which occur bimonthly. Notwithstanding, an Eastern Song Sparrow, *Melospiza melodia melodia* (Wilson), built her nest on a salt marsh where it was found on July 3, 1936, along the Annisquam River (tidal inlet) in Gloucester, Massachusetts. It was a typical nest, placed on the ground and hidden under an overarching tuft of the marsh grass *Spartina patens* (Ait.), resembling greatly that of the Sharp-tailed Sparrow. It contained five eggs. At the time of discovery, it was eleven days after one inundation and thirteen days before the next one was due. A daily watch was made to determine if nesting would be completed before the next period of spring tides. After several days, however, the eggs disappeared with only fragments of shell remaining, and the nest was abandoned. If timed properly, such nesting could be completed successfully between inundations, but otherwise the nest would be flooded out.—RALPH W. DEXTER, *Kent State University, Kent, Ohio.*

A fishy bird story.—In the spring of 1940, I was working as a fire guard on the Shasta National Forest in northern California. My station was located on a mountain stream called Shovel Creek, which is heavily stocked with trout fry each year by the California Division of Fish and Game.

A few days after several cans of fish had been planted a few hundred yards below my station, a fisherman came to me with a strange story. He said a Robin was hopping around in the shallow water catching the young trout. Having been trained that forest guards should treat the sportsman and camper with respect, I gave a courteous answer but felt like telling him that he was abusing the fisherman's license to exaggerate. However, being much more interested in wildlife than in forest fires, I chanced leaving my telephone to ring unheard and went in search of the outlaw but resourceful Robin.

I didn't have to search. The first thing I saw upon reaching the spot was a brightly-colored Robin hopping from stone to stone and picking something out of the stream. I ran back to my station and in a few minutes returned with my eight-power binoculars. For the next half hour or more, telephone and forest fire were out of my mind, for I was watching a male Robin very deftly catching young trout and taking them to young in the nest. He would stay on the dry stones most of the time but occasionally hopped into the water deep enough to cover the tarsus. He did not return to the nest with each fish but would usually catch two or three, holding them crosswise in his bill, before leaving the stream.

The red-breasted fisherman continued his activity for at least a week, during which time several people were taken down to observe the spectacle. I started to build a blind in hope of photographing the bird with fish in his bill, but was called to help fight a forest fire and did not return for several weeks. The Robin was no longer catching fish when I returned.

This is admittedly a most unusual observation but, for the sake of my reputa-

tion, I am happy that several reliable witnesses can be named. At the time of the occurrence I corresponded with Dr. T. S. Roberts, under whom I had studied. Since then, he has reprimanded me each time I have visited him for never having written the story for publication. That is why, after three and one-half years, I have finally written the account, although it should have been done sooner.—JAMES W. KIMBALL, *Senior Biologist, Nebraska Game, Forestation, and Parks Commission, Pierce, Nebraska.*

Are the seasons changing?—It is often said that the seasons are changing, but here is a bit of evidence to the contrary. At Williams College, situated in Williamstown, Massachusetts, there are official weather reports from 1816 to date. The early ones were made by Prof. Chester Dewey and, along with weather data, he noted other happenings including dates of arriving spring birds. These make interesting comparisons with my own records of birds made one hundred years later in the same place. In the first volume of records from 1816 to 1838, the average date of the first Robin was March 15 and my records from 1916–1938 give exactly the same average date. The dates of the first Robin ranged from March 3 to April 2 a century ago, and from March 1 to March 30 in the latter group of years. For the Bluebird, the early records averaged March 14 for the first one seen, and mine average March 18, with a range in those previous twenty-three years of March 5 to April 1 and in the corresponding years of this century it was March 7 to April 14.—WM. J. CARTWRIGHT, *Williamstown, Massachusetts.*

***Cractes* vs. *Perisoreus*.**—Ridgway (Bull. U. S. Nat. Mus., 50, pt. 3: 750, 1904) proposed the use of *Cractes* Billberg (Synop. Faun. Scand., 1, pt. 2: 14, 1928) as an earlier valid name for *Perisoreus* Bonaparte (Giorn. Acadico, 49: 42, 1831), and cited *Corvus infaustus* Linnaeus as type species. The A. O. U. Committee on Nomenclature rejected this proposal on the grounds that *Cractes* was simply a substitute name for *Garrulus* Brisson (*see* Auk, 25: 394, 1908), but Sharpe (Hand-L. Gen. Spec. Birds, 5: 614, 1909) adopted Ridgway's arrangement as did Hartert (Vög. Pal. Fauna, Ergänzsb.: 22, 1932). More recently, Amadon (Amer. Mus. Novitates, no. 1251: 5, 1944) has reopened the discussion by similar use of *Cractes* instead of *Perisoreus*.

In order to examine the case at first hand, and lacking a copy of Billberg's exceedingly rare work, I wrote to Dr. W. H. Thorpe of the University of Cambridge, England, where a copy is preserved. Dr. Thorpe most kindly sent me a transcript of the original account of *Cractes* which deserves reprinting here in order to make the evidence accessible to interested workers. The original description is contained in a footnote to which reference is made in the generic heading, as follows:

"G. 6 CRACTES*), *Sv.* Skrika.

. . . . . .

"*) Hab. Gener. *fere* Corvi; *sed capite proportionaliter majore et multo minore; pennis capitis longis pro lubitu erigentibus.—Sine omni dubio hoc Genus distinctum; sed nomen genericum* Garrulus Brissonis *speciebus pluribus avium ut triviale attributum, ineptum est, unde* Cractes, *e voce* Κράκτης (clamator), *adoptavimus.*"

From this paragraph it is clear that Billberg was simply proposing *Cractes* as a substitute for *Garrulus* to which he took exception. He designated no type for his genus. Consequently the type first to be established for either generic name

became automatically the type of the other (*see* International Rules of Zoological Nomenclature, Art. 30, II, f). Gray (Cat. Gen. Subgen. Birds: 37, 1840) selected "*Garrulus glandarius* (L.)" as the type of *Garrulus*, antedating Ridgway by many years. Both *infaustus* and *glandarius* were discussed by Billberg but even their omission would not have altered the situation since the manner of proposal of the generic name *Cractes* placed it at once in the synonymy of *Garrulus* Brisson.—JOHN T. ZIMMER, *American Museum of Natural History, New York, N. Y.*

Nesting notes on the Arctic Tern.—On July 27, 1943, I visited a colony of Arctic Terns (*Sterna paradisaea*) that were nesting on an unnamed island a few miles off the Frederikshaab Glacier on the southwest coast of Greenland in latitude 62° 09′ N., longitude 50° 21′ W. In area, it is 300 yards by 100 yards—one of the largest of a group—and has an elevation of about 100 feet. At high tide, approximately 75 per cent of the island is covered by a grass which is up to ten inches in height. In the center of the island there is a small freshwater lake measuring 60 by 15 feet and with a depth of several feet. The island appeared to be the only one in that immediate vicinity where the terns were nesting.

To determine the approximate number of nests, our party of three Greenlanders (Eskimos) and two Americans took a census. Nest positions, cover, and predation were noted. Walking abreast and at 20-foot intervals, we counted the nests over the length of the island. The nests consisted simply of grass which had been packed down. Practically all of them were entirely exposed, and all were placed on the grass. In many cases, however, they were on narrow grass ridges in rock crevices. We counted 279 nests, and it was felt that this represented over 90 per cent of the total. There were 181 nests with two eggs each; 95 had one egg each; and three contained three each. No hatched eggs were seen.

Predatory birds were not observed near the island, although several Snowy Owl pellets were found near the nests. These contained bones and small white feathers. Two pairs of tern wings also were found. Bird predators probably are a negligible factor here in nest losses. Human beings appear to be a much greater predatory factor.

Previous to our decision to make the nest count, three of the Greenlanders in our party had gone to the island and collected 146 eggs. This represented the rifling of about 92 nests. Eggs are something of a delicacy in Greenland, and the collection was made for food. Inasmuch as this island is on a moderately traveled route for small native boats, food-hunting natives probably account for a considerable loss of eggs. Examination of most of the collected eggs showed some of them to be fresh and others in all stages of incubation. However, the freshness or the developmental stage of the embryo apparently did not influence the Greenlanders. All the eggs were boiled and eaten with relish.

Some of the eggs which occurred singly in the nests were fresh and some were incubated. This was the case also with clutches of more than one egg. The Greenlanders claim that the terns nest twice every season. Two or three eggs were reported as being the usual number for the first nesting and one egg for the second nesting. However, the destruction or disturbance of the first nest may have occasioned the building of a second.—CARL R. EKLUND, *Capt. Air Forces, Arctic Section, ADTIC, 25 Broad Street, New York City.*

Breeding records of the Prairie Horned Lark in Kentucky.—The Prairie Horned Lark (*Otocoris alpestris praticola*) probably did not breed in Kentucky until very recently. As late as 1931, Pickwell in his monograph (Trans. Acad. Sci., St. Louis,

27, 1931) listed Kentucky as a doubtful state, where the breeding status of the Horned Lark was based merely upon the presence of the birds in two localities in summer. Even now there appear to be only two published records of the species breeding in the state. Hibbard (Auk, 52: 465, 1935) observed them feeding young near Ollie in central Kentucky, and Virgil King reported a nest in Grant County in the western part of the state on June 11, 1940 [Ky. Warbler, 16 (4): 45, 1940]. A third locality may now be added with the discovery of three nests in Jefferson County. Burt Monroe found a nest in Anchorage on May 10, 1940, containing three young. The writer discovered a second nest within the corporate limits of Louisville, April 4, 1943, and Thomas Smith located the third one, April 24, 1943, in Jefferson County about five miles east of Louisville. The last nest is now in the collection of Monroe at Anchorage.

The Louisville nest was kept under close observation for 22 days and the activities of the Horned Larks compared with those described by Pickwell (op. cit.). The nest had been built on the Seneca Park golf links, 110 feet from a paved highway and 195 feet to the left of a green. It was situated in a bare, level spot where the stubble was barely an inch high. There was a 'paving' of lumps of mud on the north side over which the female always entered. The nest presumably was built during the last week in March and the eggs laid March 31 and April 1 and 2. Incubation was performed entirely by the female. This is in agreement with Pickwell's conclusion but in contradiction to several authors. On only one occasion did the male visit the nest before the eggs hatched. Then he ran up to the nest and, while standing on the edge, thrust his head down among the eggs seven times. This may be his method of determining whether or not they have hatched.

The method of incubation is very peculiar and deserves more study than has previously been accorded it. In order to feed, the female leaves the eggs for short intervals and then every five to ten minutes hurries back to warm them. This alternate cooling and warming does not seem to injure the embryos. On April 6, a cold day (54° F.), the female was off the nest 28 minutes and on it 32 minutes. She left the nest six times, during which the average time off was five minutes, 24 seconds. On April 8, a warm, sunny day (80° F.), she was off the nest 35 minutes and on it 26 minutes. She left the nest four times, during which the average time off was increased to eight minutes, 45 seconds.

The eggs hatched on the late afternoon and night of April 13. Feeding of the young was performed by both parents but only the female was observed to brood. On the sixth day, the heaviest nestling was banded (weight 10.7 grams). Two days later it was found dead but unmarked, ten feet east of the nest. Many observers have emphasized that Prairie Horned Larks keep their nests scrupulously clean. It is suggested that a parent saw the bright band and attempted to remove it from the nest. The nestling was thus dragged to its death by a too zealous parent. If this is true, Horned Larks should not be banded until they are ready to leave the nest.

On the eleventh day after hatching, at 5 p. m., the two remaining nestlings weighed 16.2 and 17.2 grams. The next afternoon (April 25) at 6 o'clock, the larger nestling had already left the nest. The remaining one weighed 17.1 grams. A few minutes later in the gathering dusk, it hopped from the nest and followed a parent out across the open fields. The nestlings had remained in the nest nearly twelve days, two days longer than the average of ten days as given by Pickwell.

They had grown more slowly, too, for the average weights of his birds at ten days was 18.02 grams. It is hoped to check this by further studies in order to determine whether this slower rate is typical of the race in this locality.

Since there were no other pairs of Prairie Horned Larks in the vicinity, the male had no opportunity to defend his territory. Nevertheless, both parents fed within a fairly well-defined area chiefly to the east and north of the nest. When I chased the male, he retreated about 100 yards from the nest and then flew around me into the center of the territory. On only one occasion was the male observed to resent the presence of other species, when he chased one of a flock of Vesper Sparrows (*Pooecetes gramineus*) away from the nest but not off the territory. On another occasion, the female was much disturbed by the presence of a flock of Starlings (*Sturnus vulgaris*) near the nest. She chased one a few feet away. Then, as a second flew in, she rose to meet it, but the larger bird failed to be intimidated and alighted near-by. She continued to walk nervously near the nest until the Starlings had departed.—HARVEY B. LOVELL, *University of Louisville, Louisville, Kentucky.*

European Widgeon in Alabama.—Hasbrouck's account of the status of the European Widgeon (*Mareca penelope*) in North America (Auk, 61: 93–104, 1944) makes desirable the mention of a hitherto unpublished sight record of the species in Alabama. This individual was discovered on a small swimming pool within the city limits of Tuscaloosa, on March 30, 1939. At a considerable distance the writer was first led to believe it to be a Redhead (*Nyroca americana*). Fortunately, however, the bird permitted so close an approach that the vermiculations on the sides and the buffy crown were plainly visible even with 4-power glasses.

The number of records listed by Hasbrouck for the interior during the winter period (Oct. 1–March 31) is only 34, but it is extremely likely that this individual was a north-bound migrant. (Between April 1 and September 30, 131 records are cited for the interior.)

Previous records for the Southern States, excepting those on the Atlantic Coast, are from Louisiana (three) and Texas (seven). Thus the record at Tuscaloosa appears to be the only one for the Southern Interior, east of the Mississippi River.—HENRY M. STEVENSON, *Department of Biology, University of Mississippi, University, Mississippi.*

European Widgeon in California.—A full-plumaged male European Widgeon (*Mareca penelope*) was observed at Lake Merrit, Oakland, California, on January 23, 1944. It was first seen at the feeding grounds about noon. Apparently ill at ease among strange surroundings, it paced nervously through the flocks composed of Pintails, Baldpates, Mallards, and gulls, near the feeding pool and kept a watchful eye on the visitors peering over the fences. It soon flew out toward the lake and was not observed until a couple of hours later when it returned to the feeding grounds. It stayed but a few minutes and then flew back to the water's edge, away from the congestion of ducks and visitors, where it rested more quietly. It fed for a while, pecking all competitors which came near it and even fighting with Pintails on several occasions.

The male widgeon was in full breeding plumage, having a rich chestnut head, with deep cream or buff forehead. It was observed at approximately twenty-five feet, with a telescope used for the study of details in feather construction, so the observer was positive of identification.

On the following Sunday, a thorough search was made for the bird but it could not be found.—Corporal Maynard F. Reece, *Headquarters Company W.S.C.T.C., Camp Kohler, Sacramento, California.*

White-fronted Goose at Rouses Point, New York.—On November 3, 1943, through the courtesy of Mr. M. T. Chapman, Superintendent of Game, New York State Conservation Department, I was informed that a specimen of White-fronted Goose (*Anser a. albifrons*) had been killed a short while before on Lake Champlain by Lieutenant John Owen, U.S.N.R., of Rouses Point, New York. Mr. Chapman was kind enough also to enclose for my information a copy of the letter relating to the goose which, under date of October 23, 1943, Lieutenant Owen had addressed to the Conservation Department.

Since the opening paragraph of that letter relates specifically to the bird in question and contains the essentials of the collector's first impression of his kill, a verbatim quotation thereof follows: "On 22 October, last, I shot a goose on Lake Champlain just south of the village of Rouses Point [Clinton County]. The following is an accurate description of the goose: White forehead, bordered with black, upper part of the head is brownish, breast and stomach is brown-white with numerous blotches of black; feet are yellow with dark nails; bill is pink with white nail; eyes are brown; length is 29 inches; wing 17½ and bill 2½ inches long." It is at once obvious that the specimen concerned is a White-fronted Goose.

Immediately upon receipt of this information I wrote to Lieutenant Owen asking for any further data that he might have concerning the bird and what disposition had been made or was to be made of the body.

Unfortunately, I was a little late in my request. Under date of November 10, 1943, Lieutenant Owen reported that, having failed in his attempt to obtain the services of a taxidermist in preserving the goose, he had given the bird to their colored cook who lives at Port Henry, New York. Upon inquiry, Lieutenant Owen found that "she dressed out the goose last night [November 9, 1943], burning the entrails and head and other non-edible parts."

Lieutenant Owen's letter also carried the following pertinent remarks supplementing the data previously transmitted: " . . . I neglected to give the weight of the goose which was 7¼ pounds, four days after it was shot. The exact locality of shooting was at Catfish Bay about ¼ mile south of the Rouses Point breakwater . . . The time of shooting was about 8:30 A. M. Weather was warm and overcast. The goose decoyed to a stool of about fifteen blueball decoys, came from the northeast and was alone."

As a partial compensation for the disappointment which I felt in the complete disappearance of visual evidence of the goose in question, Lieutenant Owen announced that he had "about ten feet of colored 8 mm. movie" of the bird and generously offered to lend the film to me. On December 15, 1943, I received the Kodachrome film, some six feet of which show the dead goose, as it is held at arm's length, in the flesh in various positions. A detailed examination of this film provides substantiating evidence for Lieutenant Owen's statements and enables me to present the following brief supplementary remarks: White of fore-face bordered behind by a distinct blackish line. Breast and upper belly grayish white, the blackish cross-patches irregular in shape, size, and distribution; some were sharply pointed, the shape more or less like that of a maple leaf; a good deal of grayish interspersed among them. Area of under tail-coverts distinctly whiter than area immediately anterior thereto. The total available evidence suggests that this individual may have been an adult female.

So far as I am able to determine, this is the sixth specimen of White-fronted Goose reported to have been collected in New York State. Records available to me indicate that the five specimens previously collected (1844–1889) came from the Long Island area. An additional sight record (1889) also is available from that territory. And the only other point that I know in New York State from which the species otherwise has been recorded is Chautauqua Lake in Chautauqua County [Bull. Buffalo Soc. Nat. Sci., 4: 34, July (1881) 1883].

Unfortunately, since no visible part of the White-fronted Goose here reported has been preserved, this account must serve for verification of the record of a species which apparently has not been taken in this state in more than fifty years.—DAYTON STONER, *New York State Museum, Albany, New York.*

The European Migratory Quail in North America.—The account by John C. Phillips (U. S. Dept. of Agriculture, Tech. Bull. 61: 38–39, 1928) of the widespread liberations of the subspecies, *Coturnix c. coturnix*, in the United States and Canada is very satisfactory but, if sporting magazine records can be trusted, may be somewhat enlarged and corrected. To his list of states in which these birds were released can be added Connecticut, Maryland, and Iowa. Phillips does not cite actual records of breeding, though the bird was reported to have occurred in Maine, Vermont, Massachusetts, Connecticut, Pennsylvania, Virginia, Ohio, and Ontario. Moreover, he says that, "after migration there was never any return movement." Observations of the Quail the year after introduction are noted for Maine (Everett Smith, Forest & Stream, 18: 28, 1882), Vermont and Pennsylvania (*op. cit.*, 15: p. 30, 1880–81); Massachusetts (Horace P. Tobey) and Connecticut W. H. Williams, *op. cit.*, 13: 927, 1879–80), and New York (*op. cit.*, 16: 453, 1881). The birds were seen for three years in succession at Allentown, Pennsylvania (*op. cit.*, 18: 223, 1882). Breeding in two successive years was reported for Connecticut (Sage and Bishop, 'Birds of Connecticut': 184, 1913) and Vermont (Forest & Stream, 11: 56, 1878–79).

The European Migratory Quail achieved mention in a few local lists and in Coues's 'Key' (6th ed., 2: 751, 1927), but has not yet been noticed in the A. O. U. Check-List. The facts appear to be that the bird was introduced over an extensive range in total numbers aggregating thousands, that individuals were seen in the areas of liberation for two years in six states and for three years in one state, that the birds bred in eight states—for two successive years in two of them—but that it did not become permanently naturalized. To sum up, it was a breeding bird in both the United States and Canada but it became extirpated. Probably there is no definite criterion by which such cases can be judged, and they exist in every degree from introductions that produced no tangible results to the entirely too successful colonizations of the Starling and English Sparrow. To what extent these histories should be recognized in ornithological literature is a question not easy to answer, but one with which the writer is faced in a large work now in preparation. Are there any suggestions?—W. L. MCATEE.

Western Burrowing Owl in Clark County, Washington.—Specimen no. 91 in my collection, an immature male Western Burrowing Owl (*Speotyto cunicularia hypugaea*), was collected about four miles south of Battle Ground, Clark County, Washington, October 18, 1942. The owl was flushed from the edge of a small stubble field which was surrounded by brushy pasture land and second-growth Douglas fir. This habitat is altogether different from the open prairie in which

these owls are usually found. The region was originally heavily timbered. This bird was probably either a migrant from Northern Puget Sound region or a transient that wandered down through the Columbia gorge from east of the Cascade Mountains. This is the only Burrowing Owl I have seen in Clark County.—JAMES BEER, *2904 Harney St., Vancouver, Washington.*

Great Black-backed Gull breeding in New York.—A pair of adult Black-backed Gulls (*Larus marinus*) was first seen in the colony of Herring Gulls (*Larus argentatus*) on the north end of Cartwright Island on July 18, 1940, when I banded 145 young Herring Gulls. Cartwright Island, a part of Gardiner's Island off eastern Long Island, is about one-half south of Gardiner's. On July 4, 1941, Christopher McKeever and Geoffrey Gill, of Huntington, L. I., banded 165 young Herring Gulls on Cartwright while I banded the young Ospreys. On July 25, 1941, I banded 56 young Herring Gulls on Cartwright. On these three trips, the adult Black-backed Gulls were present on the north end of the island and would always fly overhead, excitedly scolding me while I was in the vicinity of what was probably their nesting area. Although I believe the Black-backs nested in 1940 and 1941, no young were found among the 366 young gulls banded in these two years.

My next trip to Cartwright was on July 10, 1942, in company with my son David and the Rev. Oliver Degelman of Riverhead. I had banded 30 young Herring Gulls when, upon capturing the next young gull, I at once knew I was holding the evidence of the first nesting of the Black-backed Gull in New York. The bird was nearly grown and would be flying probably within a week. Mr. Degelman photographed the young gull and it was soon wearing band no. 41-673757.

In comparing the young Black-back with the young Herring Gulls, I noticed that, in addition to the difference in size, the tail feathers seemed to be the best means of separating the two species. I did not wish to collect the young gull to establish the record, so before I released it, the central and outer tail feathers were pulled out as a definite means of identification. The tail feathers were sent to Ludlow Griscom and Robert C. Murphy and both confirmed the identity of the species, stating that the tail feathers were about as important evidence as a whole skin.

In 1921, the southern limit of breeding range of the Black-backed Gull was Nova Scotia, according to A. C. Bent (North American Gulls and Terns, Bull. U. S. Nat. Mus., 113: 79, 1921). The first definite breeding record of this species in Maine was in 1931 when 13 pairs were found nesting at ten different stations along the coast by Arthur H. Norton and Robert P. Allen (Auk, 48, no. 4: 589–592, 1931). In 1930, this species nested on Duck Island of the Isles of Shoals group off the coast of New Hampshire as recorded by C. F. Jackson and Philip F. Allan (Auk, 49, no. 3: 349–350, 1932). In 1931, the first breeding record of this species in Massachusetts was at North Gooseberry Island, Salem, as recorded by Richard J. Eaton (Auk, 48, no. 4: 588–589, 1931). Joseph A. Hagar informs me in correspondence that in June, 1941, he saw a pair of adults and caught two young on Wepecket Island off the west shore of Naushon Island in the Elizabeth Islands group in Buzzards Bay, Massachusetts. He saw a mated pair there in 1939 and 1940 but found no evidence of nesting. This latter breeding locality off Cape Cod is about 75 miles northeast of Cartwright Island, New York. The breeding range of the Black-backed Gull has been extended some 450 miles south along the Atlantic Coast from Nova Scotia in 1921 to Long Island in 1942. Cartwright Island now is the southernmost breeding locality of both Black-backed and Herring Gulls in the United States.

It might be of interest to place on record the breeding bird population of Cartwright Island, which is a low, sandy island about one-half mile long with no trees or buildings. High tides in winter often wash over the island and the hurricane of September, 1938, washed away the only building, a fisherman's small shack, as well as all the Osprey nests. Apparently, the first record of Herring Gulls nesting on Cartwright was in 1936 when John L. Helmuth found a set of eggs and about a dozen pairs of adults. In 1937, Dr. W. T. Helmuth estimated there were 30 to 40 pairs of Herring Gulls nesting. My first trip to Cartwright, on July 11, 1938, revealed 18 Osprey nests, 82 adult Herring Gulls, 200 Roseate Terns, and 1000 Common Terns nesting. On July 13, 1939, there were 24 Osprey nests, 250 adult Herring Gulls, 100 Roseate and 1000 Common Terns. On July 10, 1942, there were 14 Osprey nests, 500 adult Herring Gulls, and 200 terns. This would show that the terns are decreasing while the gulls are increasing, despite the fact that the Ospreys kill many young gulls that venture too close to their nests. It will be interesting to follow the rise and fall of these colonial-nesting species on Cartwright Island.—LEROY WILCOX, *Speonk, Long Island, New York.*

Tree-top migration of Savannah Sparrow.—The Savannah Sparrow (*Passerculus sandwichensis*) makes its spring appearance in Central Maryland from approximately the 18th of March to the middle of May, when it is usually found along roadsides adjacent to meadows and in closely cropped fields. On April 18, 1934, while I was procuring specimens at McDonogh, Maryland, a group of some fifteen birds was noted in the crown of several white oaks, at a height of fifty feet, hopping from limb to limb. It was beyond question that they were sparrows because of their conformation and sparrow-like characteristics, but the species was not determined until several of the birds were procured, when they proved to be Savannah Sparrows. The spring and fall migration of this species has been noted by the writer since 1929, but this was the first instance of tree-top migration.—BROOKE MEANLEY, *208 Oakdale Road, Baltimore, Maryland.*

Evening Grosbeak at Lexington, Virginia.—The Evening Grosbeak (*Hesperiphona vespertina*) is so rare in the southeastern states that any occurrence is worthy of note. On February 28, 1944, a small flock of two males and four females visited my yard in Lexington, Virginia. My attention was first drawn to them by their chattering notes. Almost at once they flew to a neighbor's yard, but I was able to follow them up and to study them with Zeiss 8X glasses at short range and as long as I wished. Although I had never seen the species, there was no difficulty about the identification. The unusually heavy, pale yellowish bill, general yellow color, and black and white wings in both sexes, the yellow forehead and brownish yellow upper breast and back in the male, and the white inner tips of the tail feathers in the female all were clearly noted. On coming into the house, I checked with several color plates. The birds were in rather higher plumage than is usually pictured.

There is only one previous report of this species from Virginia—a single bird seen at Alexandria in March (?), 1940, and described to Dr. William B. McIlwaine, Jr., by a friend (The Raven, 11, nos. 5–6: 30–31, 1940).—J. J. MURRAY, *6 White Street, Lexington, Virginia.*

Green-winged Teal in St. Croix, Virgin Islands, U. S. A.—On the morning of January 5, 1944, while I was making observations on migratory ducks that were resting on Armstrong's Duck Refuge, I was delighted to find a male Green-winged

Teal (*Anas carolinensis*) among a flock of waterbirds estimated at six hundred Blue-winged Teals (*Anas discors*), six Baldpates (*Mareca americana*), three American Pintails (*Anas acuta tzitzihoa*), and thirty Bahama Pintails (*Anas b. bahamensis*). The flock remained for several weeks and, on January 30, two pairs of Green-winged Teals were seen. A few days later all the northern birds had left the pond. This teal is of rare occurrence in the West Indies where there are but few records, of which this one constitutes the first for the Virgin Islands.—HARRY A. BEATTY, *United States Department of the Interior, Wildlife Research, Christiansted, St. Croix, Virgin Islands.*

Three new bird records for St. Paul Island, Alaska.—A single swan was occasionally observed on Webster Lake, Northeast Point, St. Paul Island, during the month of November, 1941. Later in the same month it was joined by two others. The three swans were seen from time to time feeding on Rock Lane and Cup and Saucer Lake, which are about ten miles from Webster Lake. No attempts were made to collect the birds since it was assumed that they were Whistling Swans (*Cygnus columbianus*), which have been recorded on both St. Paul and St. George Islands several times previously. Natives of St. Paul often tried to shoot one of the swans for food, but they were too wary to allow anyone to approach within shotgun range. On December 7, Antone Kushin, a native of St. Paul, shot one of the birds in flight with a .30-.30 rifle. It was brought into the village while still alive. The shot had cut a long gash across the breast muscles, rendering the bird flightless. Its weight, after the loss of considerable blood from the bullet wound, was 23 pounds, and its wing spread, fully extended, was 8 feet 7.5 inches. The broad yellow area at the base of the bill of this swan immediately indicated that it was not one of the American species.

Apparently this bird constitutes the first record for the Whooping Swan (*Cygnus cygnus*) in northwestern North America as well as for the Pribilof Islands. Formerly it occurred as a breeding bird in southern Greenland, where it is now a casual visitor, according to Bent ('Life Histories of North American Wild Fowl,' Bull. U. S. Nat. Mus., no. 130: 279–280, 1925). Knight ('Birds of Maine': 124–125, 1908) recorded a specimen taken in Maine, but Forbush ('Birds of Massachusetts and Other New England States': 302, 1925) was unable to trace the specimen and regarded it as doubtful.

A specimen was prepared from the bird but because war conditions forced the writer to leave the island very hurriedly, before the skin had opportunity to dry, it was left on St. Paul. War conditions have likewise made it impossible to secure the specimen subsequently. Skins at the U. S. National Museum were examined to verify the identification and, while the amount of yellow on the beak alone is diagnostic, the measurements also precluded the only other possibility, *Cygnus bewicki jankowskii*.

Dr. J. W. Aldrich of the Fish and Wildlife Service points out that it is not surprising that a Whooping Swan should occur occasionally in the Pribilof Islands, since it is found in eastern Siberia, in Kamchatka, and in the Commander Islands.

An examination of the stomach contents revealed a large quantity (27 c.c.) of the black sand common on St. Paul, the much eroded basal portion of some unidentified plants, a quantity of vegetable debris, such as covers the bottoms of most of the lakes on the island (total 16 c.c.), and 31 seeds (0.2 c.c.) of *Ruppia* sp. (*maritima* or *spiralis*). The total volume of the contents was 43.2 c.c.

Another record for the Pribilof Islands was a female American Scoter (*Oidemia*

nigra americana) taken October 15, 1941, in the entrance to the Salt Lagoon near St. Paul Village. This scoter was unable to fly because of a wing injury and was captured after being pursued in shallow water where it was rapidly exhausted by its efforts to swim under water. Its stomach was empty. American Scoters have been taken north of the Pribilofs at St. Lawrence Island and south of them in the Aleutians; therefore, it was only a matter of time until one was collected at St. Paul. Other ducks of the same species were observed on the Salt Lagoon during the fall. This specimen is now in the Fish and Wildlife Service collection at the U. S. National Museum.

A Sanderling (*Crocethia alba*) was shot on the shore of the Salt Lagoon on October 15, 1941, where it was feeding in company with Pacific Golden Plovers (*Pluvialis dominica fulva*), Black Turnstones (*Arenaria melanocephala*), Wandering Tattlers (*Heteroscelus incanus*), Pribilof Sandpipers (*Arquatella ptilocnemis ptilocnemis*), and Red Phalaropes (*Phalaropus fulicarius*). It appears to be the first record for this shorebird on the Pribilof Islands. The skin is in the possession of the Economic Investigations Laboratory of the Fish and Wildlife Service near Washington, D. C.—FORD WILKE, *U. S. Fish and Wildlife Service, U. S. Fur Animal Experiment Station, Saratoga Springs, New York.*

***Bubulcus ibis* in Venezuela.**—A specimen of this small white heron, native to southern Europe, Africa, and southern Asia, was collected on January 27, 1943, near San José de Tiznados, west of Calabozo, State of Guárico, Venezuela.

The collector was Octavio Arleo B., of the Museo de Ciencias Naturales, of Caracas, and the specimen is the property of that institution. It was identified by Dr. Ernst Mayr of the American Museum of Natural History.

Mr. Walter Dupouy, Director of the Museo de Ciencias Naturales, writes: "According to Arleo, the specimen was together with three others which looked exactly the same to him. The four flew past him and he shot one. Arleo states that the flight of these birds seemed much quicker than that of the small herons found around that habitat and in other places in country."

The question arises as to whether this individual, or the four seen together, were stragglers from Spain or North Africa, or whether the specimen in hand was an escaped captive bird. The species occurs in southern Spain and there is a passenger line of steamships from there to Venezuela. The locality where it was collected is on the prairies of the Apure River, in the Orinoco Valley, many hundreds of miles from the seacoast. The specimen does not show any signs of captivity but it is possible, nevertheless, that the bird may have escaped from the zoological gardens at Maracay, only 100 kilometers distant.—WILLIAM H. PHELPS, *Caracas, Venezuela.*

The Snowy Owl in New York State: 1942–1943.—Following the marked southerly mass movement of the Snowy Owl (*Nyctea nyctea*) into New York and other eastern states in late 1941 and early 1942 (*see* Stoner, D., Bird-Banding, 14, no. 4: 116–127, 1943), it occurred to me that a supplemental investigation of the bird's status immediately succeeding a peak-year of abundance might be profitable. Accordingly, I addressed communications of inquiry to fifty-five taxidermists in New York State who had furnished me with the greatest number of records in 1941–1942. In addition, some twenty other letters of inquiry were transmitted to correspondents who had supplied data and records on that invasion.

It will be appropriate to mention here that my own observations and letters of inquiry on the 1941–1942 Snowy Owl movement in New York State provided 419

records (291 collected; 128 sight) from 56 counties. The earliest autumnal record was September 28, 1941; the latest spring record, April 5, 1942. The height of the movement occurred in November (193 records) with centers of greatest abundance in the Great Lakes, Finger Lakes, Oneida Lake, Saratoga Lake, Long Island, and Hudson and Mohawk river sections.

The inquiry on the 1942–1943 Snowy Owl movement in New York State revealed the following interesting figures: A total of only 38 records (25 collected; 13 sight) was obtained from 20 counties. Half of the records came from five counties—Jefferson, three; Monroe, three; Queens, four; Saratoga, five; Suffolk, four. The remaining 19 records (16 collected; three sight) were scattered among 15 counties. Twenty-three records (17 collected; six sight) were reported for November, seven for December, four for October, two for January, and one each for February and March. Earliest fall record—October 18, 1942, Queens County; two individuals. Latest spring record—March 13, 1943, Monroe County. Both were sight records.

The following points are of interest in comparing the southerly movement of the Snowy Owl in the two successive seasons mentioned: (1) Subsequent to the very heavy seasonal movement of 1941–1942, the invasion of 1942–1943 was markedly insignificant in point of numbers; thirty of the 55 solicited taxidermists reported negatively on both collected and sight records. (2) The initial and final seasonal dates were about the same for both invasions, though the 1941–1942 movement apparently entered the state a little earlier in autumn and the last birds were sighted a little later in spring than in the 1942–1943 movement. (3) In both invasions the points of greatest concentration appeared to be along the Hudson and Mohawk rivers, Long Island Sound, and in the Great Lakes, Oneida Lake and Finger Lakes areas. (4) For both invasions, maximum numbers occurred during the last half of November. (5) One is prone to inquire whether the high mortality which greeted the invaders from hunters' guns in 1941–1942 may not have been accountable in large measure for the surprisingly small number of individuals which participated in the 1942–1943 movement. Another factor that may have had some bearing upon the disparity in the reported status of the Snowy Owl in the two seasons was the obviously smaller number of hunters abroad in 1942–1943. Compensating in some measure for this were the more minute local inquiries made by the persons solicited. Unquestionably, the Snowy Owl population in New York State in 1942–1943 was scarcely, if at all, larger than that represented by the usual winter numbers of the bird.—DAYTON STONER, *New York State Museum, Albany, New York.*

RECENT LITERATURE

Birds of Hawaii.[1]—This handbook fills a need which has become pronounced with the influx of military personnel into Hawaii. The native and introduced birds of the entire archipelago from Midway and Laysan eastward are included. Almost every species is depicted in the colored plates by Y. Oda, which are somewhat crowded with figures but not unattractive. The reproduction of color, however, often leaves much to be desired. There are also eighteen photographs of water birds. The taxonomy, which follows a check-list by E. H. Bryan, Jr., that appeared in the mimeographed 'Elepaio' of the Hawaiian Audubon Society, is modern and a great improvement over older arrangements. The number of genera recognized in the Drepaniidae still seems excessive.

Even though many species of Hawaiian birds are extinct or vanishing, Munro's brief life-history sketches are usually based upon personal experience, for he collected with Palmer and Perkins throughout the islands during the closing decades of the last century. His field work has continued to the present time, with emphasis upon banding and conservation. No one could better summarize the prevailing status of the rarer species. Suggestions for further work are offered at various places in the text. A chapter devoted to this subject, emphasizing the need for field and museum studies of the Drepaniidae would have been worth while. It is also regrettable that the brief list of books consulted was not expanded into a bibliography covering the period since the publication of the older treatises on Hawaiian ornithology. Munro's book will be indispensable to anyone interested in the remarkable avifauna of Hawaii.—D. AMADON.

The song of the Wood Pewee.[2]—Readers of 'The Auk' for some years past may remember an article by Dr. Craig (Auk, 43: 150–152, 1926) describing the twilight song of the Wood Pewee, and asking others to make records of this song and send them to him for more complete study. The present publication is the result. Twenty-two observers in seventeen states made records and sent them in. One hundred and forty-four records were made of the morning twilight song and seventeen of the evening song. These records were from sixty-eight individual birds, in localities that ranged from Maine and Minnesota, in the north, to North Carolina and Oklahoma in the south.

This is, I believe, the most complete study of the song of a single species that has yet been made, and the first one in which the gathering of data was a coöperative effort. Dr. Craig has done an immense amount of work in the study and analysis of the records, and discusses the results from almost every conceivable angle. Probably no species could be a better choice for such a study than the Wood Pewee, for the bird is common, widely distributed, with a simple, yet pleasing song, and, in the twilight song, a special attractiveness and an element of mystery that turns the task of making observations to a distinct pleasure.

The pewee sings two types of song: the daytime or leisurely singing, and the twilight or rhythmic song. The first consists of two well-known phrases, *peeawee*, or phrase 1, and *peeoh*, phrase 2. In the twilight song these two phrases are alternated in various ways with *ah-di-dee*, or phrase 3. These phrases are much alike

[1] Munro, George C. 'Birds of Hawaii.' 8vo, 189 pp., 20 col. pl., 19 photogrs., 1944. Tongg Pub. Co., Honolulu. Price, $3.00.

[2] Craig, Wallace, Ph.D. 'The Song of the Wood Pewee *Myiochanes virens* Linnaeus: A study of Bird Music.' New York State Museum Bulletin, No. 334, June, 1943. 186 pp., figs. 1–20, tables 1–13.

in individual pewees throughout the range of the bird, but individuals differ in the arrangement of these phrases in the twilight song.

The author divides each song into sentences, each sentence ending with phrase 2, which has a sound of finality. Birds often repeat a sentence over and over, and such series of the same sentence are referred to as strings. The commonest and most pleasing sentence, often occurring in long strings, is 3132. Years ago, Henry Oldys (Auk, 21: 270–274, 1904), describing the twilight song of the Wood Pewee, showed the likeness of the arrangement of this sentence and certain well-known tunes in human music, such as 'Home, Sweet Home' and 'Swanee River.' Dr. Craig now shows us, through a large number of records, that this most musical of sentences is the pewee's commonest one. It is probable, also, that this arrangement of phrases is commoner in human music than we realize. All of the Stephen Foster melodies that I know are built on that plan, and many other such songs. I tried looking through a hymn book and found six of the first thirty hymns of this arrangement.

Fifteen records of the singing of individual pewees are published—two showing the beginning of the twilight song, nine complete records of the morning song, three records of the evening song, and one record of daytime singing. In some cases there are two records of the same individual, showing how its song varied early and late in the season, or in a second year. There are also graphs of certain timed records, and tables showing the date of singing and the time of beginning and ending of the song. From these the author has worked out the time of singing in relation to nautical and civil twilight, and shows that the bird begins to sing between nautical and civil twilight, and ceases between civil twilight and sunrise. It begins earlier in June, in relation to these twilights, than it does later in the season.

There are interesting discussions of the evolution of the song and its phrases and of the psychological aspects of the song; the interpretations in such matters is theoretical rather than conclusive. The author concludes that the pewee's song is true music; that while the leisurely song of daytime serves the territorial purposes, the rhythmic song has no such function. It is independent of the brood cycle and satisfies a psychological need. The bird has musical taste and enjoys its own singing. This idea is elaborated in the latter part of the bulletin with a general discussion of bird songs as esthetic art.

A number of students of bird song have come to similar conclusions. While I agree with the author in this matter and with the statement that the pewee's twilight song is independent of the brood cycle, it is, I believe, true that no one has yet determined, in an individual case, the condition of the brood cycle when the bird begins and ends its season of rhythmic singing. Nor has the position of the nest been determined in relation to the perch from which the rhythmic song is sung. Until this is done, those who may doubt esthetic musical taste in a wild bird will have grounds for believing otherwise.

This bulletin is an important and unique contribution not only to the study of bird songs, but also bird behavior and psychology, and all students of these subjects will profit by its perusal. Those who are simply lovers of nature and of bird songs, though they care not about the why and wherefore of things, if they have yet to know the twilight song of the Wood Pewee, will profit by rising some morning before daylight and going out to hear the song. In the frontispiece of this bulletin, Edmund J. Sawyer has pictured for us everything but the song itself—

the dark woodlands, the growing light in the east reflected in the brook, and the little bird on his perch, pouring out his simple rhythmic melody.—Aretas A. Saunders.

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NOTES AND NEWS

THE SIXTY-SECOND STATED MEETING OF THE A.O.U.

The annual meeting of the American Ornithologists' Union is again of necessity restricted to a simple business meeting of Council, Fellows, and Members. It will be held, as in 1943, at the American Museum of Natural History, New York City, on Wednesday, October 25. Since fifteen Fellows and Members, including ten Fellows and five members of the Council, must be in attendance to transact the necessary business of the Society, it is urged that those members of each group who can do so will endeavor to be present.

William Lutley Sclater, Honorary Fellow of the A.O.U., died on July 7, 1944, from the explosion of a robot bomb.

Jesse D. Figgins, at one time Director of the Colorado Museum of Natural History, and more recently associated with the University of Kentucky, died on June 10, 1944, at the age of seventy-seven. Although an occasional contributor to 'The Auk,' Mr. Figgins appears never to have been affiliated with the A.O.U. He had just completed a monograph on the birds of Kentucky which will be published posthumously.

The Editor acknowledges with gratitude the kind assistance of Dr. and Mrs. A. J. C. Vaurie of New York City who aided in the preparation of the section of Periodical Literature in this number of 'The Auk.'

As THE AUK goes to press, word has been received of the death, on September 18, of J. Fletcher Street, Treasurer and Business Manager of the American Ornithologists' Union.

OBITUARIES

FRANK BOND, a member of the American Ornithologists' Union for 53 years, died at the age of 84 in Georgetown University Hospital, D. C., July 22, 1940, from the effects of a fall in his house in Washington a few days before. He and his twin brother, Fred, were born on a farm in Johnson County, Iowa, June 30, 1856, the sons of Avery John and Sabra Adaline Bond. During their early years the boys were deeply interested in birds and during their college days made a collection of some 500 specimens which, after graduation, they left to the University of Iowa. Frank received the degree of B.S. in 1880 and A.M. in 1884. Later, during a residence in Cheyenne, Wyoming, he made another collection which was presented to the local high school. In 1883 he married Henrietta Ingalls Wallace of Davenport, Iowa.

While living in Cheyenne he was a surveyor, newspaper pubisher and member of the legislature. During these years he was associated with Elwood Mead, later chief of the U. S. Reclamation Service and also with Governor W. A. Richards, afterwards Commissioner of the General Land Office. Through them he secured an appointment in Washington—at first with Elwood Mead then in charge of irrigation investigations in the U. S. Dept. of Agriculture. Later he received an appointment in the General Land Office in the Dept. of the Interior, as Chief of the Drafting Division and, in 1907, as Chief Clerk of the Land Office, a position which he held until his retirement in 1926. In the meantime, in 1903, he had been appointed a member of the U. S. Geographic Board, and later became Chairman of the Board, a position which he retained until July 31, 1934.

While connected with the Land Office, he served on the commission which revised the boundaries of Yosemite National Park, California, and made many improvements in Land Office maps of the United States to show routes of exploration, additions of territory and locations of National Monuments, bird refuges and other reservations. In recognition of his work on the boundary commission, a peak near the northern boundary of Yosemite National Park now bears his name.

Bond was elected an Associate of the Union in 1887 and a full Member in 1901. Always interested in conservation, he conceived the idea of making all Reclamation reservoirs bird refuges and added 43 in one Executive Order. As part of his regular duties he prepared the original drafts and diagrams for all of the National bird refuges established prior to July, 1926.

Frank Bond possessed considerable artistic ability. He made sketches of a number of birds for Knight's 'Birds of Wyoming,' illustrated an article on the flight of the Prairie Chicken for 'The Auk,' and made the drawings for his book 'My Bird Boarders.' At one of the early meetings of the Union in Philadelphia, W. L. Baily exhibited some paintings of hummingbirds made by his uncle, showing the metallic colors of the gorget, but admitted that he did not know how the metallic hues were produced. Bond became greatly interested in the subject, devised a method of his own, and at the annual meeting in 1921 exhibited a series of original paintings of hummingbirds and birds of paradise with their brilliant colors. Later he obtained a basic patent on his process of reproducing metallic colors.

His publications on birds, although comparatively few in number, comprise several of importance and include his contributions to Knight's 'Birds of Wyoming' (1904), a series of notes in 'The Auk,' a report on the birds of the ricefields of Louisiana and Texas (in Bulletin 113 of the Office of Experiment Stations, U. S. Dept. Agriculture, 1902) and a summary of his experiences in feeding birds at

his home in Washington. This last work appeared as a privately published volume entitled 'My Bird Boarders,' issued in 1933, and contained observations on 46 species attracted to his feeding shelf. His contributions to 'The Auk' include about a dozen notes on the occurrence of rare or uncommon birds in Wyoming, an account of the Prairie Chicken in Iowa, and an obituary notice of his colleague, Wilbur C. Knight. Bond's main contributions to ornithology are not to be found in bibliographies or lists of papers but are none the less important. During the publication of the 'Ten Year Index to The Auk' for 1921–30, he personally checked about 8,000 cross-references in the proof, thus greatly increasing the accuracy of the work. After his retirement from government service, he spent several years in the Library of Congress working on the Deane collection of portraits of ornithologists. During this time he prepared a complete index of the individuals in the group photographs of the Union, indexed the minutes of the A. O. U. Council meetings, and prepared a comprehensive index of bird artists of the world. This index contains notes on nearly 2,000 bird artists from the earliest times down to date and forms one of the card indexes on file in the Fine Arts Division of the Library of Congress.—T. S. Palmer.

Miss Harriet Elizabeth Freeman, an Associate of the American Ornithologists' Union for more than twenty years, died in Newton, Massachusetts, December 30, 1930, in her 84th year. Born in Boston, March 13, 1847, she was the daughter of Frederic William and Caroline Crosby Freeman, and lived in Union Park for more than 65 years.

She was a prominent member of the Massachusetts Indian Association and for many years served as Secretary of the Widows and Fatherless, an organization of the South Congregational Church. She was keenly interested in botany, mineralogy, forestry, and wildlife conservation, regularly attended lectures and concerts of importance, and traveled extensively. With her friend, Miss Emma G. Cummings of Brookline, she made many trips, including one around the world.

Miss Freeman and Miss Cummings joined the A. O. U. excursion across the continent to attend the special meeting in San Francisco in 1903 and at the next meeting were elected Associates of the Union. Miss Freeman was a regular attendant at the A. O. U. reunions and followed the programs so closely that she probably derived more enjoyment from the meetings than the average member. Her interests were many, her enthusiasm contagious, and her energy almost without limit. Apparently, with advancing years she found it difficult to attend the meetings and take part in the outings and in March, 1926, tendered her resignation.—T. S. Palmer.

Jesse Maurice Hatch, one of the youngest Associates ever elected to the American Ornithologists' Union, died at Colton, California, May 1, 1898, at the age of 19. He was born in Riverside, California, in 1879 and must have become interested in birds early in life. When only 15, he was elected to the Union at the New York meeting in 1894. Two years later he contributed his first paper to 'The Auk.' This was a note on the 'Occurrence of the Great White Heron at Escondido, California' in April, 1895, one of the early records of this bird near the coast. Apparently his list of published papers included only four titles, all relating to birds about his home at Escondido in San Diego County. Two of these papers appeared in 'The Auk' for 1896, one on 'The Mexican Horned Lark,' in 'The Nidiologist,' 1897, p. 104, and the other, entitled 'Notes on the Mockingbird,' was published in 'Avifauna' for September 1897, p. 41.—T. S. Palmer.

JAMES HAYNES HILL, an Associate of the American Ornithologists' Union for 25 years, died in New London, Connecticut, December 11, 1922, in his 76th year. He was born in China, of white parents, in 1846, and lived there for fifteen years when he shipped on a junk. Three days out at sea the vessel was seized by pirates who left it a wreck. A few days later it was sighted by an American frigate and the boy was found in a cabin. He was adopted by the captain, who named him James Haynes Hill and brought him to New London, where he was sent to public schools and later became a successful real-estate dealer.

Hill was much interested in birds, had a collection of mounted specimens and was Secretary of the Fishers Island Sportsmen's Club for a number of years, beginning about 1887. He was elected an Associate of the Union in 1897 and was appointed a member of the Committee on Bird Protection in 1901, a position which he filled for several years. He was not a prolific writer but published several brief notes in 'The Auk' for 1901 and 1902. These contributions included a report, in 1901, on the status, in 1900, of the gulls and terns on Fishers Island, New York, at the east end of Long Island Sound; and, in the volume for 1902, notes on the White-winged Crossbill in captivity, 'Connecticut Bird Notes' and an interesting letter describing the occurrence of Snowy Owls on Fishers Island in the winter of 1901–1902.—T. S. PALMER.

SAMUEL BRAGG LADD, a former Associate of the American Ornithologists' Union from 1899 to 1902, died at Reading, Pennsylvania, September 26, 1931, at the age of 73. He was born at Bellevue, Ligerne Co., Pennsylvania, September 21, 1858, and was the son of Joseph A. Ladd. After graduation from the Normal School he became associated with his father in a book and stationery store but he was much interested in natural history and his chief hobby was collecting birds and eggs. He was particularly interested in the warblers that nested in the vicinity of Philadelphia and also made several trips to the mountains of North Carolina in search of specimens. Here he was assisted by John S. Cairns of Weaverville, North Carolina, who obtained many specimens for him, including the southern form of the Black-throated Blue Warbler, described by Dr. Coues as Cairns's Warbler. Ladd had provided Cairns with a special small-gauge gun for collecting specimens but after Cairns's tragic death by the accidental discharge of his gun on June 10, 1895, Ladd apparently lost interest in collecting. Shortly after this accident he disposed of his collection to Harry G. Parker of Philadelphia and during the latter part of his life devoted his attention to other things.

Ladd was one of the ornithologists, including John K. Townsend, Ezra Michener, Josiah Hoopes, T. H. Jackson and B. H. Warren, whoe field activity has made Chester County famous in the annals of Pennsylvania ornithology. In 1894 he was elected an Associate of the Union but retained his membership only three years. Nothwithstanding his activity, Ladd apparently published little either on his experiences in the field or on his collection. He published one note in 'The Auk' (8: 314–315, 1891), containing a description of the nests and eggs of Grace's Warbler and Coues's Flycatcher and one in the 'Ornithologist and Oologist' for 1892 (pp. 129–130), the latter an account of the 'Nesting of the Black-throated Blue Warbler in Buncombe Co., N. C.' In the same volume of the 'O. and O.' (p. 118) may be found a statement regarding the Ladd collection of warblers' eggs then represented by 37 species or nearly two-thirds of the warblers' listed in the A. O. U. 'Check-List.' These specimens included nearly 2000 eggs in 449 sets.

Ladd is survived by his son, Paul O. Ladd, of Key West, Florida, who has kindly furnished much of the foregoing information.—T. S. PALMER.

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